

The People

ETHNIC BACKGROUND

The prehistory of Bangladesh and the adjoining area is far from being clear. Some research has been carried out : far more needs to be done. From the material available, a few tentative conclusions can be drawn. The earliest known people in this area were Negritos (Hutton 1931), of whom traces are still found, among various tribes, from Assam to the Pilipinas (Philippines). The next group to enter were the Proto-Australoids. They were dolicocephalic, platyrrhine, and dark brown in complexion. They probably came from western Asia and spread far into South-East Asia. They are presumed to have learnt agricultural practices in South-East Asia and to have introduced them to areas in and adjoining Bangladesh (Chatterjee 1952).

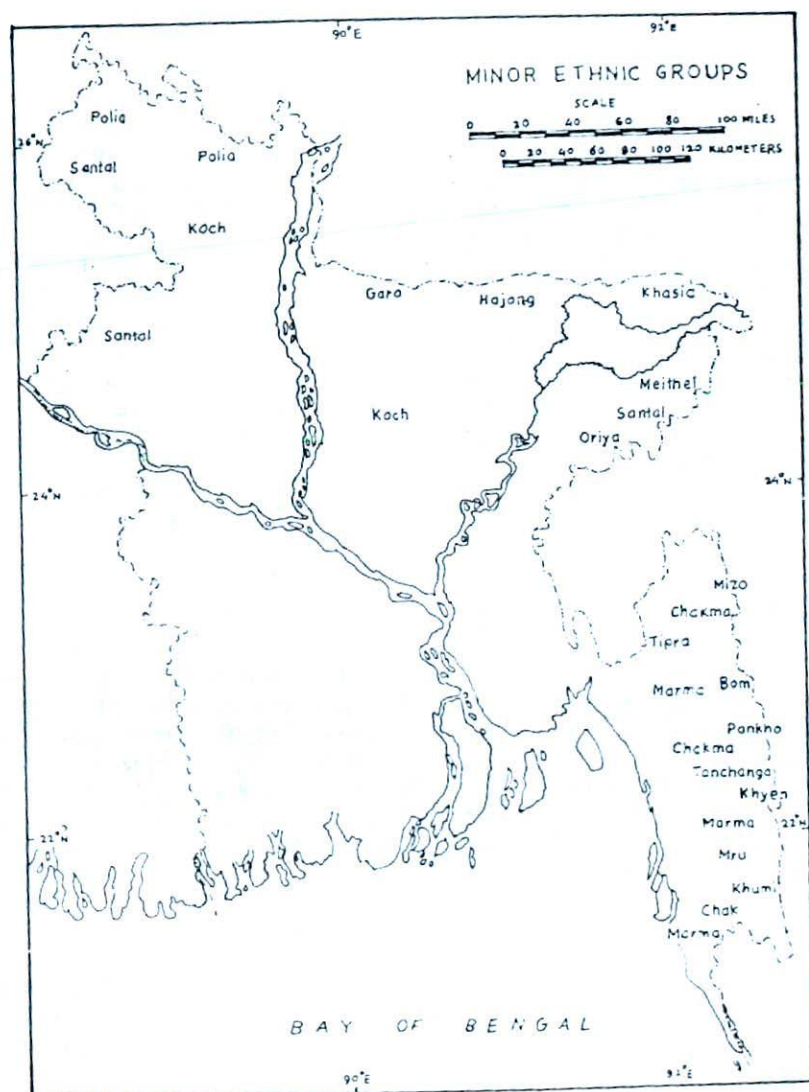
The hypothesis that they most likely introduced agriculture into Bangladesh is supported by the distribution and type of Neolithic shouldered adzes which have been found (Worman 1949). This hypothesis is also supported by the survival of Austric words in Bengali and related languages. Words such as Lungal (Plough), Narikel (Coconut), Lau (Pumpkin), Ganda (four) and Kuri (twenty), are Austric in origin. Carl Sauer's arguments for South-East Asia as the cradle of agriculture strengthens this hypothesis (Sauer 1952). These proto-Australoids were probably followed, from the east by a wave of Proto-Mongoloids, some of whom most likely spread as far as the Chhota Nagpur Plateau. The main migration route of the proto-Mongoloids was, however, towards south-east Asia. Soon other elements were added to this melting pot. Dolicocephalic Mediterranean Caucasoids (the main element of those peoples called 'Dravidian') (Ghurey 1923), and Caucasoids of the brachycephalic Alpine type entered the sub-continent from the north-west and spread as far east as Bangladesh (Chanda 1916). It has not yet been established whether these Alpine-type people came into the sub-continent before or after the dolicocephalic Caucasoids known as Aryans. Be that as it may, yet another element seems to have come in. Brachycephalic Armenoids were very likely one of the main elements in the Indus Valley Civilisation of the 2nd and 3rd millenium B.C. According to B.S. Guha it were

these Armenoids and not the Alpines who introduced the Caucasoid brachycephalic type (Guha 1931). It may be that both strains entered this area. All this happened, most likely, between 2500 B.C. and 1000 B.C.

From the beginning of the first millennium B.C., the process known as Aryanisation (Majumdar 1943), but better called Brahmanisation, began. Many dolicocephalic Caucasoids of the Upper Ganges Valley moved down to the Lower Ganges Valley and even pushed into the Brahmaputra Valley. The tribes of this region were brought within the pale of the Vedic religion, which however, due to that very expansion, changed into the Hindu religion. The considerable influence of the non-Aryan on the Vedic religion and its followers was countered by what has been called "Brahmanizing of the aboriginal Non-Aryan tribes" (Risley 1891). The upper classes of the non-Aryans were absorbed into the Upper Castes of the new system, while most of the non-Aryans were relegated to what is now known as the Scheduled Castes. By this process the immigrant Aryans mingled with the Armenoid and Alpine elements to form the Bengali Brahmans, Boddos (Vaidyas) and Kayasths. The second strata (Sat Sudra) seem to have formed of these three strains but with a considerable admixture of proto-Australoids and the Mediterranean Caucasoid strains. The next strata (Sudra), it appears, have even less of the three socially dominant strains. The lowest strata, composed of Hindu castes such as Chamar, Dom, and Pod and the aboriginal tribes such as Badgi and Hadi, are most likely Proto-Australoids and Mediterranean Caucasoid in the main. From the 11th century A.D. onward, due to the Muslim conquests, people from all over western Asia and the northern areas of the subcontinent immigrated and settled here. They were mainly of Caucasoid, Armenoid and Mongoloid strains. Rulers of Turkic origin were dominant for several centuries, so it may be presumed that a considerable Turkic strain was added to the melting pot. The absence of a caste system in Islam obviously led to crossings of all local strains amongst the Muslims. Risley's view that the roundheaded element in the Bengali-speaking people is due solely to a Mongolo-Dravidian admixture (Risley 1891) has been discredited by the findings of Guha and of Chanda. But that Mongoloid influence on Bangladesh has been quite strong cannot be doubted. It has been strongest along the eastern border, where a number of Mongoloid tribes live in close proximity.

The people of Bangladesh can be divided into four ethnic groups. The Dravidian group consists mainly of Oraons, with a few others of south Indian origin. The Oraons are a tribe of Central India, from where some were brought to the tea estates of Sylhet and Chittagong in the first quarter of this century. In 1931, there were about 40,000 persons, in areas now in Bangladesh, speaking a Dravidian language. Most of these were Oraons. By 1951, however, most of them had left. There were then only about

Map 8.1



3,000 persons whose mother tongue was a Dravidian language (Census of Pakistan 1951). Most of these can be presumed to be of Dravidian stock and are in the Sylhet tea gardens.

The second group consists of those who are mainly proto-Australoid in origin. The Santals and Khasis are the two main components of this group. The homeland of the Santals is the Chhota Nagpur Plateau, from where they have been migrating north-eastwards since the 1870s. Migration brought them into Goalpara (Assam) by the 1920s. Within Bangladesh, they settled in the Barind Region, where they cleared the jungles and practised agriculture, as long as they were not bothered for taxes ! When disturbed they moved on, mostly towards Assam, leaving the clearings for the local people or a fresh batch of Santals. In 1947 this north-eastward move was blocked. Most of the Santals within Bangladesh have settled in villages of their own and given up their semi-nomadic habits, which has, of course, been forced upon them by the disappearance of the Barind jungles. There are at present about 250,000 of them. In the west, they are concentrated in Nachol, Porsha, Haripur and Ranisankail Upazilas, and in the east several thousand of them are in Sylhet as tea garden labourers. The Khasis are in the east ; their stronghold is the Khasi Hills portion of the Meghalaya Plateau. In Bangladesh they are concentrated in Sylhet District, where there are about 25,000. Another 700 or so are in Chittagong. Most of them are tea garden labourers.

The Mongoloid element is well represented. In north Bengal, the people known as Polia are mainly Mongoloid, with some proto-Australoid admixture. They are closely related to the Koch, who inhabit the same area. The Koch belongs to a large group, which is both ethnic and linguistic, known as Bodo or Bara. Within this group are the Garo, Hajong, Kachari and Tipra. The Garos (of whom there are about 80,000) live in the Susang Hills Region mainly in Haluaghat, Durgapur, Kalmakanda Jhenaigati and Nalitabari Upazilas and at the northern end of the Madhupur Tract (Madhupur Upazila). They are a sturdy people, whose stronghold is the Garo Hills District (in Meghalaya state, India) immediately to the north of the Susang Hills. They call themselves Mande Kusik (Playfair 1909). The Hajong are a branch of the Garo, who have absorbed some non-Garo (Barai, Hari, etc.), element in them. They live to the east of the Susang Hills. Kacharis are numerous in Cachar, a district in India, and a few are found in the contiguous district of Sylhet. To the south of them stretches the Tipra country. The Tipras apparently derive their name from Tui-Pra (near the sea) (Webster 1910). Within Bangladesh they are almost confined to the Hill Tracts District. The majority of them are in Ramgarh Sub-Division with a fair number in Sangu and Matamori Valleys. The Riang, who are often classed as a separate tribe, are actually a sect of the Tipras. The total number of Tipras will be about 55,000.

The Hill Tracts area, comprising Khagrachhari, Hill Tracts and Banderban districts, as yet, in the nature of an ethnological storehouse, with thirteen different tribes, who are divided into nearly a hundred different sects. The most numerous of these various Mongoloid people are the Chakma. There is a strong but erroneous belief amongst the Bengalis that the Chakmas are the result of extensive Arakanese-Bengali inter-marriage. There is no evidence to support this view. Though many of them do have Caucasoid features this is quite common among proto-Mongoloids. They are divided into two sub-tribes : Chakma, and Taungjainya or Tanchanga. The Chakma is the largest of these sub-tribes and is found mainly in the Kassalong and upper and middle Karnafuli Valleys. They numbered an estimated 203,000 in 1981. The Tanchangas live mainly in the Rinkheong Valley, and a few are settled at Alikadam (Matamori Valley), Nakhongchari and Ukhia Upazila : there are only about 17,000 of them. The Mogh are the second most numerous group, numbering about 135,000. They have two endogamous groups : the Jhumia Mogh and the Murma, Myamma, Roang or Rakhaing Mogh. The Jhumia Moghs have been settled in the Chittagong Region for a long time and live mainly by Jhum cultivation. The Rakhaing Moghs are recent immigrants, having come from the Arakan in the latter part of the eighteenth and early nineteenth century, when their kingdom was being conquered by the Burmese. They live mainly by weaving or fishing. The Baruas or Rajbangshis have sometimes been included with the Moghs, but they are a distinct Bengali-speaking group, who however profess Buddhism. They are probably partly descended from the Arakanese who took Bengali wives when they ruled the Chittagong sea-board. The features of most of them have a slightly mongoloid cast, while a few do not show any Bengali feature.

The third biggest tribe in the Chittagong Region is the Tipra and the fourth biggest, the Mru. So little was known of the Mrus till recently that Risley does not list them separately. Till the 1951 Census their numbers were but very approximately known. In 1981 there were about 17,000 of them, mostly near the upper courses of the Sangu and Matamori rivers. Bengalis call them Murang, which causes confusion since there is a sect of the Tipras by that name, but not of the Mrus. Some of the Mrus are quite fair. Hutchinson thought them to be non-Mongoloid, at least in appearance (Hutchinson 1909), but this is not so. They have unmistakably Mongoloid features.

The other tribes of the Hill Tracts District are comparatively few. The Kukis and Lushais live in the northeast, close to Mizoram State in India. They call themselves Mizo. A few Kuli and Halam (a tribe of the Lushais) are settled in south-east Sylhet District. The women wear very prettily designed sarongs. Both sexes have more clothes on than is usual among the other Hill tribes. There are only 5000 Kukis, Halams and Lushais within Bangladesh.

There are five little-known tribes in the southern part of the Hill Tracts. All of them probably belong to the Mizo/Chin group. The Bom or Bon, are usually referred to as the Banjogi by the Bengalis. They number over one thousand and are found mainly to the east of Ruma. The Pankho are a very closely related people, nowadays found in Subalong and Dumdumia areas in the upper Karnafuli Valley. The Khumi or Khami is another tribal group of this area. Not much is known about their customs or language. They are generally distrustful of strangers. The Khyen are an offshoot of the Chins. About a thousand of them are settled along the upper reaches of the Kaptai Khal. The Chak are a little known tribe in Nakhongchari Upazila. They have usually been mistakenly included among the Chakma (even in the 1951 Census). There are several theories of their origin (Chaudhuri 1931) and it is possible that they are the remnant of the original Chakmas (Loeffler 1954).

Some Manipuris, from Manipur State in India, have settled in Sylhet District mostly in Sylhet, Kamalganj, and Chunarughat Upazila. They are essentially Mongoloid, but often with a marked infusion of Bengali strains. A few Mikir from the northern side of the Meghalakaya Plateau are also found in south Sylhet. This completes, more or less, the list of tribal peoples within Bangladesh. The biggest group of people is non-tribal and known as Bangali, after the language they speak.

It has been often mooted that the Bangalis are homogenous in origin. That is absolutely incorrect. Amongst them the various Hindu castes have varying proportions of proto-Australoid, Mongolid and Caucasoid strains. The upper castes among the Hindus have finer noses, lighter complexions and a more Caucasoid cast or features than is general among the lower castes. Amongst the Muslims, however, this broad generalisation does not hold true. Though in the main, composed of the same strains as the Hindus, there has been more intermixture with people of Turkic, Semitic and Aryan Caucasoid origin. Many Turks, Persians, Arabs, and other peoples of Iranian, Semitic and Turanian origins settled here. Their main settlements can still be discerned by the features of the Muslims living there. Many Muslims of Noakhali and Chittagong districts have slightly hooked noses, full beards and sharply chiselled features, very similar to the Arabs of Yemen and Oman. In certain areas such as Doublemooring, Hathazari, Anwara, Raozan and Boalkhali upazila of Chittagong district, Pakunda and Hosenpur upazilas of Mymensingh district, Madhupur upazila of Tangail district, Chandpur, Hajipur and Comilla upazila of Comilla district, Begumganj upazila in Noakhali district, Tejgaon upazila in Gazipur district, Dhamrai upazila in Dhaka district, Golapganj and Beani Bazaar upazila in Sylhet district, and so on, the proportion of people with light coloured eyes is more than elsewhere. It is no mere coincidence that there is historical and traditional evidence

of 'Pathan' (which includes Turks, Persians and Pakhtuns) settlement in these very areas. Certain tribes beyond the Indus (the Afridis for example) have a large proportion of persons with light coloured eyes. In those areas of Bangladesh named above, the proportion of persons with hazel, grey, blue or green eyes varies from one in five hundred to nearly one in a hundred. A few have light brown or auburn hair, but not all of them have a light complexion. Some Hindus too have light coloured eyes ; they are either from one of the higher castes or from one of these areas where there was considerable 'Pathan' settlement. It is often assumed quite wrongly that this fair element is partly descended from the Portuguese. The Christians who can trace back the conversion of their ancestors to the advent of the Portuguese are not markedly fair. Moreover most of these pockets of fairer people are outside the farthest limits of Portuguese harassment.

The heterogenous group, known as Bengali, is by far the largest of all, being more than 98% of the total population. There are more than 110 million of them in Bangladesh. Their language and culture is dominant. There are also about 200,000 immigrants from Bihar, Uttar Pradesh and Gujerat. In the tea-gardens there are some Oriyas, Bunas, Nunevas and other people from the Chhota Nagpur Plateau who were brought in before 1947 and have settled in Bangladesh now. They are either non-tribal or in such small numbers that their tribal grouping has almost disappeared.

DRESS & FOOD

Most of the tribal people scattered along the borders of the country dress differently from the Bengalis. Certain groups such as the Santals, Tipras and the Chakmas have in large measure adopted the dress of the Bengalis, but the majority have their own types of dresses. The dress of the women in almost all the tribes is a short or long sarong. The Polia, Garo, Khasi, Manipuri and Mogh women wear sarongs which reach from just below the shoulders to the knees. The Tipra and most Chakma women wear shorter sarongs, tied at the waist. The married Tipra women, in the southern part of the Hill Tracts District, often do not wear anything above the sarongs, but the Chakmas usually do. The Mru women have the shortest dress ; this consists of a ten to twelve inch broad, thick blue cloth which barely reaches round the hips, and is kept up by strings of beads. When it is cool they cover themselves with broad, thick cotton shawls.

The men's dresses in the various tribes are rather similar. Their working dresses are loin-cloths ; for the Mrus its their only dress, Turbans and jackets are worn on special occasions. Those Tribal people influenced by Bengali culture (especially the Chakma) wear Lungis or Dhuties. Most tribal people usually wear big cotton shawls during winter.

The tribal peoples are generally liberal in their choice of food. Rice is the staple diet, supplemented by millets, maize, vegetables, fish and meat. It is in the matter of meat and drinks that they differ greatly from the Bengalis. Besides beef, mutton and chicken, nearly all of them relish pork. The Moghs and Tipras are fond of fermented fish (Nappi). The Santals are partial to Dhora snakes and the Garos to eels. The Lushais' specialities are white-bellied rats and whit-haired dogs. The Mrus eat a variety of insects and rodents. Liquor plays an important part in the social life of the tribals. The Garos have such special liquors as Chu-bichi and Mi-mitim (Playfair 1909). The Lushais have their Zu and Rakzu drinks (Webster 1910); the Moghs drink Tari and Pachwai; the Tipras celebrate with Khung, Sipa and Arak. The Chakmas prepare a very potent brew from the fruit of the Cashewnut tree (Cashew - apple).

The Bengalis are divided into two major religious and cultural groups, the Muslims and the Hindus. They wear somewhat different clothes and have different eating habits. The Muslim men generally wear a Lungi (the Sarong of Indonesia) and an uncinched shirt. Pyjamas are also commonly worn. Caps of white cloth are popular, especially in the south-eastern districts. Turbans are rarely worn. The older Hindu men, generally wear a Dhuti, which is a long piece of cloth wrapped around the waist and legs with one end pulled up between the legs and tucked in at the waist. With this goes on uncinched shirt, preferably collarless. The younger Hindu men prefer to wear pyjamas or trousers. The educated urban people of all social and religious groups have taken to trousers and shirts worn cinched. Those who can afford them wear light woollen shirts in winter. Others wrap light woollen shawls.

Bengalis are generally much more conservative than the tribals in their dietary habits. The Muslims do not touch pork. The Upper Caste Hindus do not take pork or beef. Some of the Scheduled Caste Hindus eat pork and tortoise, but none will eat beef. The staple diet of all these communities is rice, pulses, fish and vegetables. Meat is uncommon, except in the urban areas. They preferred cooking medium is mustard oil, and food is usually heavily spiced.

RELIGIONS

Islam is professed by about 86.6% of the population (1981 Population Census). The Hindus are divided into two groups, the Caste Hindus and the Scheduled Castes. The Caste Hindus comprise such castes as the Brahman, Boishyo and Kayasth. The Hindus, as a combined group, account for 12.1% the total population. They are divided into more than 130 castes and 1,500 sub-castes. The complexities of the Hindu religion cannot be

entered into here ; suffice to say that their culture differs to a great extent from that of the Muslims, even though there is racial and linguistic affinity between the two groups. The Buddhists are the next group in size, but with only 538,000 persons they form only 0.6% of the total population. The Christians are the fastest growing religious group, but in 1981 numbered only about 275,000 (0.3% of the total population). The remainder of about 250,000 persons consist mostly of animists.

The Chakma, Chak, Mogh and Mru are overwhelmingly Buddhist, with many animists among the Mru. Most of the Khumi and Kyang have been converted to Christianity since independence. About half of the Bom, Pankhu, and the Mizos (Kuki-Lushais) are also Christians. The Tipra claim to be mainly Caste Hindus ; there are also many Buddhists and Schedule Caste Hindus among them. The majority of the Riangs are Scheduled Caste Hindus. The Khasis are partly animist and partly Scheduled Caste Hindu, the latter being rapidly Christianized. Polias and Koches are Hindus ; those who can afford the caste distinction, claim to be Caste Hindus, while the others are not too particular. The Garos are mostly Christians. Among the Bengalis, Christians are most numerous in Dhaka, Khulna, Mymensingh and Khulna regions, and are growing fast among the tribals of the Hill Tracts. The few thousand Baruas of Chittagong are the only Bengali Buddhists. The remainder of the Bengalis are either Muslim or Hindu. The distribution of these groups is discussed in more details in Chapter 17.

LANGUAGES

Bangla (Bengali) is the language of the majority of people. It is the mother-tongue of over 98% of the population. Within Bangladesh, 110 million persons speak it ; in India and Burma and in many scattered colonies of Bengalis, it is spoken by over 70 million. With a total of over one hundred and eighty million speakers, Bangla is the seventh most extensively spoken language after Chinese, English, Russian, Spanish, Hindi and Arabic. It is one of the many languages of the large Indo-European family of languages. To place it more accurately, it belongs to the eastern sub-group of the Indo-Aryan branch of languages. Other languages of this sub-group are Bihari (Maithili), Oriya and Assamese (or Osomiya). The classical language of the Indo-Aryan group is Sanskrit. The languages of the outer branch, however, developed along with or even prior to Sanskrit (Chatterjee 1926). The evolution of the languages, as they are at present, stretches over three millenia. The 'original, unartificial vernacular' is known as the Primary Prakrit. Its natural growth in the eastern part of the sub-continent was fossilised by grammarians into the Magadhi Apabhraṅsa, or secondary Prakrit. The vernacular language extricated itself out of this and further evolved into the various Tertiary Prakrits, of which the present Bengali is

one. Marked differences can be distinguished in the language in its various stages. At the primary stage, it had a host of words with harsh combinations of consonants. By the third stage, which began in the tenth century A.D., there were new diphthongs and delensional and conjugational terminations. After a millenium, this analytical stage is also passing.

The Bangla script is derived directly from Gupta Brahmi script, through Siddhamatrika and Gauriya. It is interesting to note that the eastern form of Gupta Brahmi and later Siddhamatrika, also gave rise to the Cambodian and Thai scripts. With Assamese, Bangla is the eastern-most of the Indo-European languages. Despite the millenia since this group scattered over two continents, there are many words in Bengali surprisingly similar in sound and meaning to those of European languages. A few examples will suffice :

| English | Bengali | Other Languages |
|----------|---------|--|
| Door | Duar | |
| Mother | Ma Mata | Mater (Latin), Mama (Spanish) |
| Father | Pita | Pater (Latin), Papa (Spanish) |
| Path | Poth | |
| Foot | Pa | Pedem (Latin), Pied (French) |
| How much | Koto | Quanto (Italian) |
| Where | Kothai | Questo (Italian) |
| Three | Tin | Trois (French), Tri (Russian) |
| Nine | Noi | Neun (German), Nuevo (Spanish) |
| Who | Kay | Chi (Italian) |
| What | Ki | Che (Italian) |
| Your | Tomar | Tuyo (Spanish) |
| Mine | Amar | Mio (Spanish) |
| Other | Onno | Otro (Spanish) |
| Nose | Nak | Nase (German) |
| Throat | Gola | Gola (Italian) |
| New | Nuton | Neu (German), Nova (Portuguese) |
| Mixing | Mishano | Mischen (German) |
| Fire | Agun | Ogni (Czech), Agi (Sanskrit) Agni (Polish) |

Since the early sixteenth century, there have been many borrowings from European languages (Chatterjee 1926). From Dutch about a dozen words have been incorporated, notably the names for cards such as Harton from harten (heart), Ruiton from ruiten (diamond), and Ishkaban from schoepen (spade). About 110 words have been borrowed from Portuguese : Of these, Towale from Toalha (Towel), Boyam from Boiao (Jar), Butam from Butao (Button), Kopi from Couve (Cabbage), Ispat from Espada (Steel), Gudam from Gudao (Godown), and Pirij from Pires (Saucer) are some of the more common ones in use at present (Campos 1919). From English, very many words have come in. The pronunciations of most of them, like chair, table, cup, machine, aeroplane and hall, are essentially the same as in English.

Along with words from European languages, there has, of course, been much borrowing from Persian and Arabic. From Persian came words used in culinary, jurisprudence, warfare and the revenue system. Arabic contributed to the ecclesiastical vocabulary of the Muslims and also many scientific and technical terms. In the Primary Prakrit stage, several Austric words had been borrowed.

The first Bangla book to have been printed was a Catholic catechism by Francisco Fernandez, which was translated by De' Soza. It was probably printed in 1598 (Grierson 1903). The earliest known mention of Bangla in any European language was in the *Sylogue* of John Chamberlayne which was published in Amsterdam in 1715 (Grierson 1903). In it, a passage in Malay, is printed in Bangla alphabet and is considered to be a specimen of the Bangla language. This curious juxtaposition may not be as gross a mistake as it is taken to be. The Portuguese pirates are known to have shipped slaves and converts from Bengal to Java and Malaya; moreover the Chittagong seamen had regular contact with those areas when old Chittagong had an active trade with south-east Asia. It is possible that David Wilkins, who forwarded that specimen, had come across it at one of the Malayan or Indonesian ports. The next important book on philology, the *Sprachmeister* of Friedrich Fritz, published at Leipzig in 1748, again printed Malay in Bangla script (Grierson 1903). By 1717, research into the philology of the language may be said to have begun, when Siegfried Bayer at Leipzig and Maturin La Croze at Berlin, corresponded with each other about Bengali and other eastern scripts (Grierson 1903). In 1734, Padre Frey Manoel de Assumpcao, a Portuguese Augustinian at Nagori, Dhaka District, wrote the '*Crepar Xastrer Ortho Bhed*', the first Bengali book in Roman script and the first one to be written by an European. It is also the first book known definitely to have been printed, having come out in 1743 at Lisbon (Grierson 1903). In 1786, Sir W. Jones recognised an Indo-European group of languages. In 1816, Franz Bopp converted that speculation into scientific certainty with his treatise, '*Ueber das conjugations system der Sanskritsprache*'. It was indeed an astonishing discovery that so many languages, from Irish in the west to Bangla in the east, belonged to the same large family. Meanwhile the scholars of the Fort William College began the spate of printed Bangla books which ultimately led to the great literary works of late 19th and early 20th centuries.

Within Bangladesh, Bangla has a number of dialects. The language of the newspapers and radio broadcasts is what is known as standard or literary Bengali. The only dialect approximating it is the one spoken in Nadia District in India. In the Northern Region, the northern dialect is spoken over most of Pabna, Rajshahi, Bogra and Dinajpur Districts. It closely follows the dialect of Nadia (known as Central Bengali) in pronunciation. A sub-dialect of this, known as Koch, is spoken by the Koches and many Santals.

It differs from the parent dialect in that its grammatical structure is like that of Oriya. In fact, the Siripuria dialect spoken in parts of Dinajpur District and the Rajbangshi dialect spoken in northern Rangpur District are closely related to Maithili and Assamese languages to the west and east of them. The most extensive dialect is Eastern Bengali. It may be divided into seven sub-dialects. The western-most of these sub-dialects is spoken in Jessore, Faridpur, Satkhira and Khulna districts. To the east of it, a slightly different sub-dialect is spoken in Bagherhat, Pirojpur, Barisal, Gopalganj and western Madaripur districts. In the Central Region, the Dhaka sub-dialect is spoken in that District and in Tangail, and the Mymensingh dialect in Mymensingh and Netrokona districts, excepting the haor areas. Haijong, a very corrupt form of the Mymensingh dialect is spoken by the Dalus, Banais, Haris and other tribal peoples to the north of Mymensingh and Sylhet Districts. In the Haor areas, or broadly speaking, in Sunamganj and Habiganj districts and eastern parts of Netrokona and Kishoreganj district, the Haor sub-dialect is spoken. It merges into the Sylhetia dialect.* To the south of it, the Tippera or Brahmanbaria sub-dialect of Eastern Bengali is spoken in Brahmanbaria district and roughly as far south as a line drawn from Comilla to Matlab Bazar. The Sylhetia dialect is also spoken in Karimganj and Cachar in India. In it, **K** is pronounced like German **Ch** : **Ch** as **S** : **Gh** as **G**. Then again **P** sometimes has the sound of **W** (Supari is often pronounced Suvari). As in Eastern and south-eastern dialects the aspirate (**H**) is often dropped. Like the south-eastern dialects, the sibilant is often changed to an aspirate (**H**). In many other points it resembles the south-eastern dialect more than the eastern. South Eastern Bengali is spoken over parts of Patuakhali District, Comilla District to the south of Comilla town, Noakhali and Chittagong Districts and those parts of the Hill Tracts District where Bengali is spoken. It has three sub-dialects.

The Noakhali sub-dialect is spoken in Comilla District, south of a line drawn from Chandpur to Comilla, in Shondip **Sitakund and Mirsarai upazilas of Chittagong District, in eastern Bhola district, some islands of Patuakhali District and all over Noakhali, Feni and Lakshmipur districts. The language of Chandpur, Mehendiganj Hijla, eastern Madaripur district and Patuakhali is a mixture, of south-eastern and eastern dialects. Chittagonian sub-dialect is spoken in Chittagong (excepting Mirsarai upazila) and Cox's Bazar districts. This sub-dialect is also spoken by the Bengali muslims of the Arakan area of Burma (Buthidaung, Rathidaung, Akyab etc). There are three or four variations of Chittagonian, depending mainly on the number of Arabic loan-words. The third sub-dialect is Chakma, which may be considered a form of Chittagonian, but in some

* Grierson considers to be this a sub-dialect of the dialect of eastern Sylhet District.

** Grierson thought that the language of this island is the Eastern Dialect.

respects it is like a separate language. It has loan words from Arakanese and is written in a script related to Burmese. Though Grierson (1903) did not realise that there are significant differences between the *Noakhali* and *Chatgaiya* (Chittagonian) sub-dialects, the two most apparent are the pronunciation of **K** and position of the negative in a sentence. In Noakhali, **K** is either pronounced clearly or reduced to **G** or **H**; in Chatgaiya, it is pronounced gutturally like the **Kh** in Arabic. In Noakhali, the negative is placed after the verb whilst in Chatgaiya, it is placed before. However, the similarity is sufficient for the speaker of these two sub-dialects to understand each other; the speakers of other Bengali dialects, however, find it quite difficult to understand them. Both of these sub-dialects have a number of loan-words from Arabic, not found in standard Bengali or other dialects.

Within Bangladesh, apart from Bangla, there are no other indigenous Indo-European languages. Migrants from various parts of India, speak various other languages, of which Urdu is the most important. This language is essentially a mixture of Hindi and Persian, with a lot of Arabic borrowings. It is written in a form of the Persian script. It is the principal language of about 200,000 persons in Bangladesh. Amongst other Indo-European languages, Hindi, Bihari and Oriya are spoken mainly by coolies in tea gardens or at railway stations. Many of the Hindi speaking immigrants originally came as coolies and are now settled near railway junctions (e.g. Santahar) or steamer stations (e.g. Goalundo).

Of the other language families, the Tibeto-Chinese has the most speakers. Only the Assam-Burmese branch of the Tibeto-Burman sub-family is represented here (Grierson 1927). The Burma group of this branch includes Arakanese and Burmese, which are spoken by about 135,000 persons. Mru is also classed in this group, though the relationship is not clear (Census of India 1931). From recent research it seems that Mru has considerable affinity to Archaic Chinese, and it is possible that Mru-speakers emigrated into the Kaladan region before speakers of the Burma and Kuki-Chin groups (Loeffler 1966). It is spoken by over 30,000 persons. The Kuki-Chin group is well represented; the South Chin sub-group includes the languages of the Khumis and Khyengs; the Central Chin sub-group is represented by the languages of the Shendoos, Bom, Pankhos and Lushais; the North Chin sub-group includes Halam and Hrangkol dialects spoken by some of the Mizos. Meithei or Manipuri, also of this group, is spoken by a few thousand in Sylhet District. The Kuki-Chin group of dialects is spoken by about ten thousand persons. The Bara group of the Assam-Burmese branch is represented by Tipra, Kachari, Garo and Koch. Tipra is spoken by over 55,000 persons; Kachari by very few within Bangladesh; Garo by about 80,000 persons; and Koch by a few thousand.

The Austric family of languages claim the next largest number of speakers. Only the Austro-Asiatic sub-family is represented here (Census of India 1931). Khasi, spoken by about 37,000 persons, belongs to the Mon-Khmer branch. Santali and other Kerwari and Kharia languages belong to the Munda branch. In the 1931 Census, 842 speakers of Palaung-Wa, a Mon-Khmer language, were reported from the Hill Tracts (Census of India 1931) but no trace of them remains at present.

The Dravidian family of languages have few speakers. The only example being the Kurukh spoken by the Oraons in the tea gardens.

Land Utilisation

FARM & CULTIVATED AREA

The total area of Bangladesh is estimated to be about 143,999 sq.km (55,598 sqm), with inland and estuarine water surface area of 9,384 sq.km (3,623 sqm), including Kaptai Lake at full level, and land area of 134,615 sq.km (51,975 sqm) (Table 9.1). The total farm area in Bangladesh as estimated by BBS is 22.68 million acres (9.178 mha) (Agriculture Census 1986).

The Net Cultivated Area (NCA) was enumerated to be 20.16 million acres (8.158 mha) by the 1983-84 Census of Agriculture (Table 9.2). This figure is the average of the two years, 1983 and 1984. The Statistical Yearbook 1984-85, however, shows the net cultivated area in 1983-84 to have been 21.38 million acres (8.652 mha). The 1983-84 Gross Cultivated Area (GCA), which includes nearly 10 million acres (4,046 mha) of multiple cropping was, therefore, about 33 million acres (13,354 mha). The 1977 Agriculture Census estimated current fallow within the total area of farm holding to be 301,000 acres (121,800 ha). On the other hand the annual statistics published by BBS shows the current fallow in 1983 - 84 to have been 1,136,000 acres (459,700 ha), Area culturable but not yet cultivated is classed as culturable waste land. This includes grazing grounds, scrub patches, village commons etc. The 1977 Agriculture Census estimated the culturable waste land within the farm area to be about 269,000 acres (108,858 ha). Most of this is in the Haor Basin. Total area classed as forest is about 5.3 million acres (2.14 mha). Since much of the unclassified state forest is either grassland or scrub, area under tree cover is about 3.5 million acres (1.4 mha). The water area, which includes the rivers, bils, haors, haor lakes and the estuaries up to the sea-face, is about 2.3 million acres (0.93 mha) The land area not available for cultivation is the remaining 6.9 million acres (2.79 mha). This includes the area taken up by village huts and compounds (uthan), urban areas, roads, embankments, sandy beaches, etc. There are serious discrepancies in land use statistics, and an analysis has shown that the NCA is probably less, and the GCA probably more, than is estimated by BBS (Rashid 1989).

Table 9.1
Area of Bangladesh and its Districts (In SqKm)

| Former District | Total Area | River Area | Forest Area |
|-------------------|-------------------|-----------------|------------------|
| Bandarban | 2,796.44 | 11.26 | 2,661.29 |
| Chittagong | 4,632.31 | 505.22 | 1,097.33 |
| Ctg. Hill Tract | 5,391.75 | 22.52 | 4,690.23 |
| Comilla | 4,101.34 | 152.85 | .. |
| Noakhali | 3,391.77 | 683.82 | .. |
| Sylhet | 7,901.80 | 180.20 | 777.15 |
| Dhaka | 4,640.35 | 333.06 | 146.42 |
| Faridpur | 4,275.11 | 292.83 | .. |
| Jamalpur | 2,080.43 | 77.23 | 20.91 |
| Mymensingh | 6,006.40 | 136.76 | 197.90 |
| Tangail | 2,114.22 | 102.98 | 159.29 |
| Barisal | 4,534.16 | 884.95 | .. |
| Jessore | 4,083.64 | 96.54 | .. |
| Khulna | 7,559.08 | 193.08 | 5,750.61 |
| Kushtia | 2,136.76 | 106.19 | .. |
| Patuakhali | 2,543.82 | 487.52 | .. |
| Bogra | 2,415.10 | 53.09 | .. |
| Dinajpur | 4,078.81 | 45.05 | .. |
| Pabna | 2,939.64 | 160.9 | .. |
| Rajshahi | 5,874.46 | 107.80 | .. |
| Rangpur | 5,961.34 | 231.70 | .. |
| BANGLADESH | 143,999.00 | 4,865.61 | 15,501.13 |

Source: 1989 Statistical Yearbook of Bangladesh, BBS.

Note : Total economic area of Bangladesh includes the EEZ (in the Bay of Bengal) which is 100,000 sq-km or more in extent.

CULTIVATED AREA

An Agricultural Census was taken in 1960 on a 10 percent sample survey basis. Its accuracy was described as being at the 95 percent probability level. From the data of this Census it was estimated that there were 6,170,610 cultivator holdings. At the next Agricultural Census in 1977, the number of farm holdings had increased to 6,257,000. This Census was on a 6 percent sample survey basis. These holdings were defined as 'all land under one operational control'. Each holding is divided into cultivated area and the area occupied by homesteads.

Table 9.2
Basic Data

| | |
|---|---------------------------|
| Number & Area of Households: | |
| Number of households | 13,817,646 |
| Number of nonfarm households | 3,772,347 |
| Number of farm households | 10,045,299 |
| Number of small farm households (0.05 to 2.49 acres) | 7,065,957 |
| Number of medium farm households (2.50 to 7.49 acres) | 2,483,210 |
| Number of large farm households (7.50 acres and above) | 496,132 |
| Average Area Operated per household (Acres) | 23,019,885 |
| Area operated per farm household (Acres) | 2.26 (0.889 ha) |
| Operated area (Acres) of farm households | 22,678,464 (89,28,529 ha) |
| Operated area (Acres) of non farm households | 341,421 (134417 ha) |
| Homestead Area; | |
| Homestead Area | 965,986 |
| Homestead Area per households (Acres) | 0.07 |
| Homestead area per non-farm households (Acres) | 0.04 |
| Homestead Area per farm households (Acres) | 0.08 |
| Percent of homestead area to uncultivated area | 33.75 |
| Cultivated Area: | |
| Cultivated Area (Acres) | 20,157,564 (7936049 ha) |
| Per farm cultivated land (Acres) | 2.00 (0.787 ha) |
| Per capita cultivated land (Acres) | 0.25 (0.098 ha) |
| Irrigation: | |
| Household reporting irrigation | 44,26,941 |
| Irrigated area (Acres) | 4,003,719 (1576267 ha) |
| Percent of household reporting Irrigation | 32.0% |
| Percent of Irrigated area to cultivated area | 19.9% |
| Cattle: | |
| Total number of bovine animal | 22,062,257 |
| Number of Household having bovine animal | 7,260,194 |
| Bovine animal per household | 1.60 |
| Per capita bovine animal | 0.26 |
| Sheep - Goat: | |
| Number of sheep-goat | 14,225,768 |
| Number of household having sheep-goat | 5,227,730 |
| Sheep goat per household | 1.03 |
| Per capita sheep-goat | 0.17 |
| Poultry: | |
| Number of poultry | 73,713,161 |
| Number of household possessing poultry | 10,270,904 |
| Poultry per household | 5.33 |
| Per capita poultry | 0.91 |
| Cottage Industry: | |
| Household with cottage industry | 1,032,381 |
| Percent of total household | 6.7% |
| Agricultural Labour: | |
| No. of agriculture labour households | 5,495,300 |
| Percent of agriculture labour household to total households | 39.8% |

Source : BBS, The Bangladesh Census of Agriculture and Livestock : 1983-84.

tanks, paths, etc. The latest Agriculture Census, carried out in 1983 and 1984, was on a complete enumeration basis. These censuses show, as expected, that the size of farms has been declining in every district (Table 9.3.). The Northern Region and the Moribund Delta have much less pressure on land than the districts to the east but, it should be noted that, average farm sizes in these areas have declined faster than in the more densely populated areas. Comilla and Noakhali districts seem to have very nearly reached the maximum density possible without chronic famine. Emigration, coupled with industrialisation at home seems to be the only way out for the people of these areas.

Table 9.3
Average Size of Cultivated Area Per Farm Holding

| Greater District | 1960 (in Acres) | 1983—84 (in Acres) |
|------------------|--------------------|-----------------------|
| Dhaka | 2.6 | 1.5 |
| Tangail | — | 1.8 |
| Mymensingh | 3.1 | 2.0 |
| Jamalpur | — | 2.0 |
| Faridpur | 2.7 | 2.0 |
| Barisal | 3.3 | 1.7 |
| Patuakhali | — | 2.4 |
| Chittagong | 2.0 | 1.4 |
| Hill Tracts | 3.8 | 2.3 |
| Bandarban | — | 2.9 |
| Noakhali | 1.7 | 1.4 |
| Comilla | 1.6 | 1.3 |
| Sylhet | 3.4 | 2.3 |
| Rajshahi | 4.4 | 2.7 |
| Dinajpur | 4.9 | 3.0 |
| Rangpur | 3.3 | 2.0 |
| Bogra | 3.3 | 1.9 |
| Pabna | 3.4 | 2.3 |
| Kushtia | 5.2 | 2.5 |
| Jessore | 3.9 | 2.5 |
| Khulna | 3.4 | 2.4 |
| Bangladesh | 3.1 | 2.0 |

Note- Tangail and Jamalpur were in Mymensingh district, Patuakhali was in Barisal district and Bandarban was in Hill Tracts district in 1960.

IRRIGATION & DRAINAGE

Land levels

Agronomically, the height of a plot above normal water level, is of primary importance, since its supply of water and its soil texture is dependent upon this factor. Fields which are normally flooded in the rainy season are classed as low-level and are known as Dohala or Dola in north Northern Region, Loyal in south-west Northern Region, Boro-Ura in Sylhet district, Nama in the rest of the Eastern Region, etc. Fields which are normally not liable to flooding by rivers or Khals (but, may be inundated to a depth of a few inches after a wet spell) are classed as high level, (known as Danga in north Northern Region, Diara in south Northern Region, Sail-Ura in Sylhet district, Ucha in Noakhali and Comilla districts, Paundi in Chittagong district, etc.). Fields of medium level are distinguished in some places (known as Shohori in Northern Region and Aman-Ura and Aus-Ura in Sylhet district). In the West-central Barind, the troughs (valleys) between the undulations are known as Hula, the slopes of the undulations as Kandar and the top as Arkandar. The comparative ease of irrigating the slopes lends considerable meaning to this division. In the Madhupur Tract, the undulations are called Chala and the troughs Baid. In Sylhet the undulations are Tila and the troughs Gul. In Chittagong, the small hillocks are known as Mura and the troughs as Dhala.

The value of the land varies not only with its comparative height, but also, naturally with its soil. The farmers often classify the plots into four categories, according to the quality of their soil and productivity, viz: Awal or first class, which can grow almost any crop and is usually double-and sometimes triple-cropped; Doyam and Soyam, second and third classes, of intermediate qualities, and Chaharam or fourth class, which is either grazing round or usually left fallow for several years after each cultivation (known as Uthit Patit or long fallow).

Traditional Irrigation

Despite the heavy rainfall, irrigation is necessary almost everywhere to grow the winter (Rabi) crop; over one metre of irrigation per unit area is needed. The maximum amount of water available for irrigation in the drier part of the year has been estimated to be 50 million acre-feet, which could, if properly utilised, irrigate 13 million acres of rice or 40 million acres of Rabi crops. At present 4 million acres of all crops (mostly rice) are irrigated. There are three main indigenous instruments for raising water. The Seuni or Swing-Basket, is a scoop

Map 9.1

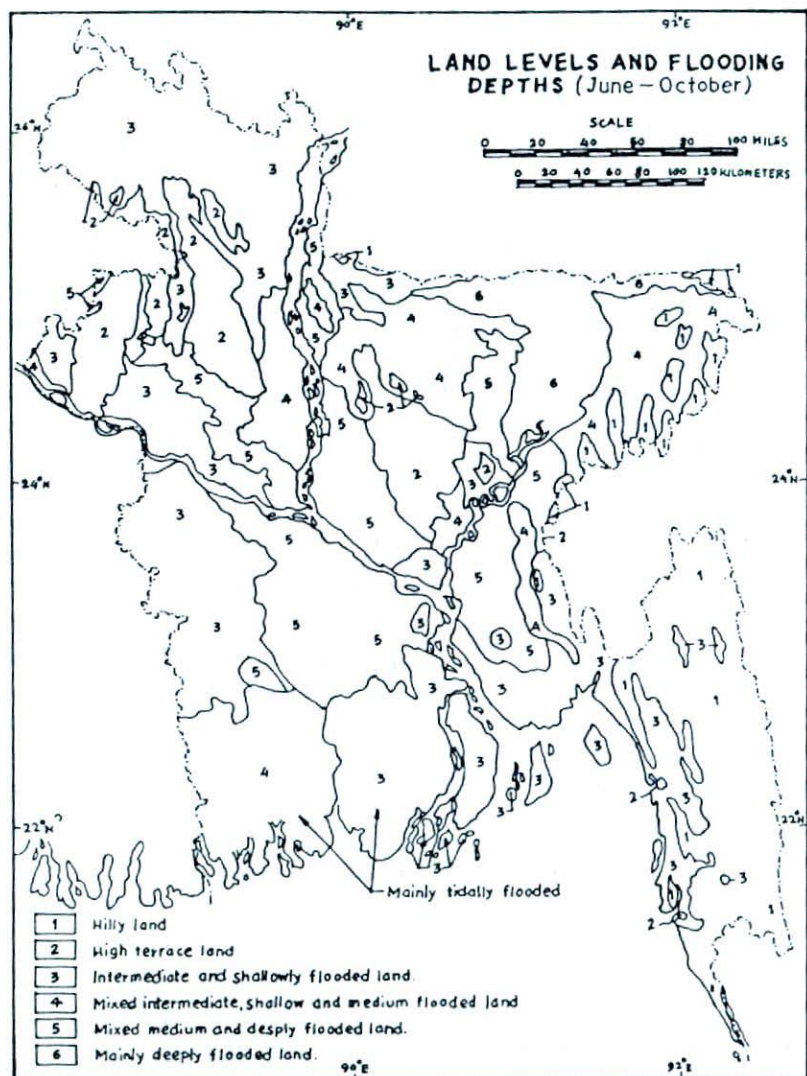


Table 9.4
Irrigated Area (in Hectares)

| Mode of Irrigation | No. in use | 1986-87 actual | No. in use | 1988-89 estimated |
|------------------------------------|------------|----------------|------------|-------------------|
| DTW | 18,680 | 378,000 | 23,000 | 465,000 |
| STW | 159,000 | 772,000 | 223,000 | 1,083,000 |
| LLP | 36,000 | 437,000 | 41,000 | 498,000 |
| Sub Total : | | 1,587,000 | | 2,046,000 |
| Gravity and / or Pump (under BWDB) | | 105,000 | | 105,000 |
| Traditional | | 324,000 | | 324,000 |
| Sub Total : | | 429,000 | | 429,000 |
| Grand Total : | | 2,016,000 | | 2,475,000 |

operated by two to four persons who swing it on ropes tied to its four corners. Water can be raised 4.9 metre by this means. About 9.4 litre is raised each time and 8.5 cubic metres can be raised in an hour. The Lata or Dhenkli raise water from shallow wells. It is a bamboo pole, operating on a fulcrum at the outer end of which another smaller bamboo is tied, which has a can tied to the lower end. The bigger bamboo has a weighted lower end, so that when it is raised and left free the can is dipped in the water and raised. It is very similar to the Shadoof of Egypt. The amount it raises depends on the size of the Dhenkli. In the tobacco growing areas of Rangpur and Dinajpur, there are Dhenklis on temporary wells, which do not raise more than 2 metres. In the drier areas of the Northern Region, Dhenklis may be made to raise water as much as 5 metres. Half a cubic foot is raised at a time, which comes to 2.5 cu. metre in an hour. The Done or Jant, is the most widely used irrigating instrument. It is in the shape of a 3 metre long canoe open at one end. The open end is at the mouth of the irrigation channel, the other end being held up by a bar which is attached to a pole on a fulcrum with a weighted end towards the land. This instrument is operated by stepping on and off the 'canoe'. This dips the closed end in the water and the weight at the further end of the bar brings it up. Each load of the 'canoe' brings up 85 litre

of water, which flows out by the open end. It can raise water as much as 1.5 metres, but is generally not used for heights of more than a metre. In an hour it can raise about 63 cubic metres of water.

The Done is the most important instrument of indigenous irrigation: it is used extensively in the West Central Barind and the Haor Basin. In the West Central Barind, there are two types of irrigation: Sechan and Melan. Sechan irrigation means the raising of water by Dones: in Melan irrigation rain water is stored in ponds on the Arkandar (undulation tops) and channelled down when needed on to the fields on the Kandar (Slope). In the Haor Basin, the fields in every Haor or Bil are terraced, with irrigation channels (Siri) in between them. The water raised by the Dones flows down these channels because of the slope a total of five or six Dones are necessary to irrigate the highest fields. In the sub-montane tract from Belonia south to Teknaf, a special form of irrigation is used. Here the water issuing from springs and flowing down streams (Chharis) is dammed till a small reservoir forms. From this, channels are led into the Paundi and rice fields.

Modern Irrigation

Irrigation by mechanized means began in 1960 and both in numbers and acreage is increasing. At time only surface water sources (river, bils, haors) were drawn upon, using low-lift pumps (LLP). Since surface water in sufficient quantity is not available in many areas tubewells of various bores were introduced to tap groundwater. At first only the larger bore tubewells (10 inches or more known as Deep Tubewells or DTW) were sunk. But later the technology for smaller bore tubewells (4 to 6 inch known as Shallow Tubewell or STW, even though they are often as deep as the DTW) was introduced and from 1977 to 1983 they increased very rapidly. As may be seen from Table 9.4, STW's now irrigate more than LLPs and DTWs combined. Prior to 1960 irrigation was almost entirely by traditional means. Due the spread of mechanized irrigation the proportion of cultivated area that was irrigated increased from 6% in 1960 to 20% in 1983. There are significant regional differences in irrigation coverage. The proportion of NCA irrigated varies from 47% in Bogra and 37% in Chittagong to only 4% in Faridpur and 2% in Patuakhali (Census 83-84). There is however little difference in the proportion of irrigated area by size of farm holdings, which varies from 23% for small farms to 18% for large farms.

Large-scale irrigation development may be said to have begun with the Blommenstein Report in 1951. Dr. W.J. Van Blommenstein

report on the feasibility of seven multipurpose projects began to take shape a few years later. The Ganges-Kobadak project, divided into several units, was the first one in Bangladesh to be based on gravity irrigation. Kushtia Unit Phase-I and Phase-II have been completed. Phase-I supplies supplementary irrigation to 90,000 acres and full irrigation, in the dry season, to 25,000 acres. The system is based on gravity canals fed by a pumping station on an off-take from the Ganges at Bheramara near Hardinge Bridge. Maximum pumping capacity is 3,900 cusecs. With the full operation of the Farakka Barrage in India, river levels fall so low, in March and April, that the intake is seriously affected. The Dhaka-Narayanganj-Demra (DND) project, with an irrigated area of 18,000 acres, was the first polder irrigation project in the country. Flooding to a depth of three meters was normal in this area, and floating rice used to be grown. After the area was poldered, Transplanted Aman rice is cultivated in the rainy season and Boro rice in the dry season. The pumps that drain the project area in the rainy season, reverse to supply irrigation water in the dry season. Unfortunately because of its proximity to Dhaka City, large sections of land within the poldered area have been appropriated for residential and industrial use.. Similar poldered irrigation has been developed in the Chandpur-Raipur areas through the Chandpur project. The rate of return for this project has been calculated to be only 2% per year (BUP 19) but a similar project has now been constructed in the nearby Meghna - Dhonagoda area.

The Karnafuli Multipurpose Project was envisaged as having an irrigation component but very little of this has been realised so far. For this project, a 670 metre long earthen dam and a concrete spillway was built at Kaptai. The resulting lake is 648 to 777 sq. km in extent, depending on the season and the operation of the spillway. When the reservoir is at a height of 33.5m. above sea level, it stores 4.33 maf. The minimum flow of the Karnafuli river, below the dam, is usually regulated at 15,000 cusecs. This has led to some improvement in the depth of water available in Chittagong Port in the dry season. The main benefit of the project has been derived in the energy sector. The three turbines, have an installed generating capacity of 230 mw of electricity (BBS 1990), are connected to the national grid and provide much needed energy at relatively low cost. The Tista Barrage and Irrigation Project in Rangpur has a gross area of 749,000 hectares. When the canals and control structures are completed around 1995, the irrigable area will be about 317,000 hectares.

Coastal Embankments

Embanking of tidal streams to prevent ingress of saline water is necessary throughout the Immature and Mature Deltas, the islands of the Meghna estuary and the coastal plain of Chittagong district. Formerly

embankments were built by those affected and were not properly maintained. Since 1960, however, the Water Development Board has implemented a Coastal Embankment Scheme designed to cover all the affected areas. The total length of these embankments are about 5150 km. The Scheme envisages the construction of about 60 polders, with sluices for drainage, but in many cases the agricultural aspects of the polders have not been developed. Total area within the polders is over 1.5 million acre (607,00 hectares).

Fragmentation of Plots & Holdings

A characteristic feature of the cultivated land is its division into very many small plots (probably as many as 75 million of them). They are bordered by slightly raised embankments, known as *Ail*, which are from 15 cm to 1 metre high and 15 to 46 cm broad. These raised Ails make the division of the plots very marked. It is estimated that Ails total about 250,000 acres. This is not a total waste, for they contain the rain water, much of which, therefore, sinks into the ground and does not run off simply as surface flow. They are very important in the Barind for only stored water can soften the ground over a considerable period time. In Nandigram Upazila, they are sometimes as high as one metre. They are also very necessary where the land is terraced. Terracing is common in all the high lands (e.g. Barind and Madhupur Tracts) and also where there is considerable slope at the edge of a river. Along some rivers such as the Suta in Mymensingh, the elevation may be as much as 6 metres which necessitates the terracing of fields at different levels. In the Barind Tract, terracing is marked along the slopes of the seasonal streams (*Khari*). The homesteads are atop the undulations and the fields are terraced on the Kandari. In the Madhupur Tract too, fields are terraced upto the Chalas. There may be as many as 20 fields, each only six inches (15 cm.) above the other. When there is heavy rain, the Ails are cut to

Table 9.5

Fragmentation of Holdings (in millions)

| | 1960 | 1977 | |
|---------------------------------|------|------|-------|
| All Farms | 6.14 | 6.25 | 100% |
| Farms with 1 - fragment | 0.62 | 0.16 | 2.6% |
| Farms with 2 or 3 fragments | 1.29 | 0.94 | 15.0% |
| Farms with 4 or 5 fragments | 1.08 | 1.22 | 19.5% |
| Farms with 6 to 9 fragment | 1.39 | 1.61 | 25.8% |
| Farms with 10 or more fragments | 1.76 | 2.32 | 37.1% |

Source: Statistical Pocket Book of Bangladesh, 1982 B.B.S. and Census of Agriculture, 1960.

let the water flow down from the fields into the pool or stream at the lowest part of the slope. Terracing is also practised in most of the hilly and sub-montane areas of the Eastern Region. Tea gardens are usually terraced. Bench terracing is not possible on the higher ranges of the Hill Tracts because of their steep gradients and the lack of stones to build strong walls.

Worse than the fragmentation of plots is the fragmentation of holdings. A fragmented holding is one which comprises of several fields scattered about, with fields of other holdings in-between. Sometimes the fragments are a kilometer or more apart. Those farmers with many fragmented holdings waste a lot of time merely getting from one fragment to the other. The colossal extent of fragmentation can be judged from the figures estimated in the 1977 Census of Agriculture (Table 9.5).

Rotation of Crops

The climate is no bar to cultivation throughout the year. The summer-rainy season crop (Kharif or Bhadoi) sometimes needs artificial irrigation but mostly thrives upon the Nor'westers in their early stage and the monsoon rains later on. The late rainy season crop (Haimantik) depends entirely on rain. The winter (Rabi) crops may not need water if sown on fields which have been inundated for most of the rainy season e.g. (Haor edges) but need continual irrigation if grown on sandy soils (e.g. Chittagong Paundis). The double-cropped (Dofasli) grow either Rabi and Kharif crops or Kharif and Haimantik crops. Triple-cropped fields grow Rabi, Kharif and Haimantik crops. Rotation of crops is obviously necessary where two or three crops are grown, but it is not always possible. Due to the absence of any desire to eat more vegetables or drier cereals, farmers generally prefer forming two crops of rice off the same land. Rotation is, however, quite widely practised, more especially in areas with less than 170 cm of rainfall, where the variety of crops is more than in the wetter areas.

In the sugarcane growing area, a typical cycle is :

| | | |
|----------|--------|-------------------------|
| 1st Year | Kharif | Aus rice |
| 1st Year | Rabi | Sugarcane planted |
| 2nd Year | Kharif | Sugarcane growing |
| 2nd Year | Rabi | Sugarcane harvested |
| 3rd Year | Kharif | Aus rice |
| 3rd Year | Rabi | Sugarcane planted, etc. |

In many areas, the rotation is as follows :

| | | |
|----------|--------|---|
| 1st Year | Kharif | Aus rice |
| 1st Year | Rabi | Sugarcane |
| 2nd Year | (Full) | Sugarcane (previous year's crop) |
| 3rd Year | Kharif | An early crop of linseed followed by Aus rice |

In the Banana gardens of Dhaka district, bananas are grown three years followed by a sugarcane crop, which lasts one and a half years, to be followed again by bananas.

In the high Chars along the Brahmaputra-Jamuna, Ganges, and Old Brahmaputra a typical rotation is :

| | |
|--------|---------------------------------------|
| Kharif | Aus Rice |
| Rabi | Pulses and melons often sown together |
| Kharif | Jute |

In the Western Jamuna Plain, the two year rotations may be as follows :

| | | |
|-----------|--------|------------|
| 1st Year | Kharif | Aus rice |
| Haimantik | | Aman rice |
| Rabi | | Mash pulse |
| 2nd Year | Kharif | Jute |
| Haimantik | | Shan-hemp |

Another two-year rotation is :

| | | |
|----------|-----------|------------|
| 1st Year | Kharif | Jute |
| Rabi | Mustard | |
| 2nd Year | Haimantik | Aman rice |
| Rabi | | Some pulse |

The commonest rotation is Aman rice followed by Khesari, Mash or Masur pulse. The sowing of Khesari after Aman is very common in the Bhar Basin and Noakhali district. In all rice double-cropping areas, the rotation is Aus rice-Aman rice often followed by Khesari or Masur pulse on some of the fields, mainly for fodder. In parts of northern Chittagong district beans are grown extensively around the rice fields. In most places jute is not immediately followed by another crop, but Aus rice is rotated with it in alternate years.

Maps 13.2 and 13.3 show to what extent the land is cultivated. Orchards and bamboo clumps have been included in the Net Cultivated Area. The Gross Cultivated Area, therefore, is not so high as it would have been if only field crops were considered. A belt of very fertile

and well used land is noticeable, stretching from the north-east corner of Rangpur district (Kurigram Upazila) south-east to central Chittagong district (Satkania Upazila). The potential capacity for double-cropping in the Haor Basin, the edges of the Sunderbans and parts of west Northern Region, can also be clearly seen. In all these areas the C.W.L. is large.

AGRICULTURAL IMPLEMENTS

Most of the agricultural implements used by the farmers are quite primitive. It is one of the glaring examples of the stagnation of technology in the East that the plough has not changed its form in the last two thousand years. The other implements, too, can possibly be dated to as early a period. An average farm holding is 2.2 acres of which 2.0 acres are cultivated. For that much land, a farmer needs two bullocks, a plough, a ladder, a rake, a levelling beam and several sickles, to plough, sow and harvest his land. Other implements that will be used in his agricultural activities are the Dao knife (and the Chheni knife), Nirani (weeder), wooden mallet, hand spade, axe, winnowing basket, raking hook, goad and muzzle.

The draught bullocks are very weak. When ploughing, the average draught is 45 kg, and a bullock's power works out to 3,300 ft. lbs. In one day a yoke of bullocks can, on the average, plough 0.40 acres, and can manage the ploughing operations for 5 acres during an agricultural season. The ploughs are generally from 9 to 14 kg in weight, and are, therefore, very light. The Rangpur ploughs are the lightest: they plough to a depth of only 5 cm. The ploughs in the islands of the Meghna Estuary are the heaviest: they have sides shaped like mould-boards which give them the appearance of ridging ploughs. They plough furrows of 13 cm. depth. The average plough makes furrows of 9 cm. None of them plough sufficiently deep. Deep ploughing in the wet tropics generally leads to increased leaching and dessication, but ploughing to a depth of 23 cm has met with prolonged success all over Bangladesh. However if the ploughman is broken by deeper ploughing a new ploughman has to be formed to retain water for rice cultivation.

The harrow, usually called a ladder (Moi) is made of bamboo and drawn by bullocks to level the fields. The levelling operation by these ladder-like devices is often called 'laddering'. A thick beam is

sometimes dragged to do the levelling. In the drier areas and those with very clayey soil, large clods remain on the fields even after they have been ploughed. These are broken with a long wooden mallet, known as Itamar or Delamar. A wooden beam with long teeth is used as a rake (Bidia) to break down clods even further. Short scythes are used in cutting field crops such as rice, wheat, barely, jute, etc. Long scythes (Kaida) are used in the Eastern Barind. Vegetables are usually plucked by hand. The Nirani, weeding knife, and the hand spade (Pashon) are used mainly in vegetable gardens. The Dao and Chheni (or seni) knives are common to most of the South-East Asian peoples. Their blades are slightly curved, 30 to 40 cm in length, 8 cm broad and sharpened on one side only. The handle is made of wood: those of bamboo root are said to be the best. The common Dao (backing knife) is more curved and somewhat less sharp than the Chheni. The hill Dao is longer, broader, with a square-end and a slightly concave blade. They are used to cut wood, coconuts, bamboo, etc. The Chheni is common only in the south-east: it is mainly used to cut down coconut and betelnut bunches. The hill Dao, rather like a machete, is used in the Hill Tracts district and the adjoining areas of Chittagong district. A large chopper, the Ramdao is used by the Hindus to decapitate goats which are sacrificed in religious ceremonies. Small curved knives tied to long poles are used to cut off mangoes and lichee and drop them into nets attached to those poles. Axes are used only by professional woodcutters and by farmers who live at the edges of the forests. Their blades are only 15 cm long and 8 cm broad, with little cutting power. The winnowing basket is one of the various implements needed for husking rice and other cereals. The raking hook is used to keep the sheafs of rice, laid on the ground, under the feet of the cattle as they go round and round a post and trample out the grain. The muzzle, usually of bamboo is, of course, to prevent the cattle from feeding themselves on the straw and grain which they trample. If the farmer grows much oilseeds, he may have an oilpress operated by bullocks, or if he wants to make sugar he will have pans in which the liquid is boiled. These pans are 1.8 metre in diameter and 46 cm deep.

Fertilizer Use

Traditionally crop fertilization has been confined to the use of cowdung or oilcakes on cash crops such as sugarcane and tobacco. Chemical fertilizer have made very slow headway even though they are sold at nearly half the world market price. Recently the use of fertilizers

has increased. In 1971-72 only 0.24 million tons of fertilizers were used. But in 1987-88 the use of fertilizers was 1.5 million tons. The use of fertilizers has increased 7.8% at 12.7% per year during the past fifteen years. The spread of high yielding varieties (HYV) rice has to be matched by a fast rise in fertilizer use since they are tailored to high nutrient intake. The three main types of fertilizer sold are Urea (45% Nitrogen), Triple superphosphate (45-48% Phosphorus) and Muriate of Potash (60% potassium). At present only the tea gardens use Ammonium sulphate (21% Nitrogen). For most crops balanced dosages of Nitrogen (N), Phosphorus (P) Potassium (K) and Sulphur (S) are recommended. The table below gives the recommendations (Islam, 1967) in terms of pounds of nutrient per acre.

Table 9.6

Fertilizer Recommendation
(In pounds of Nutrient per acre)

| | Nitrogen | Phosphorus | Potassium |
|-------------------|----------|------------|-----------|
| HYV Rice | 140-200 | 70-129 | 70-120 |
| Aus rice | 40 | 40 | 20-40 |
| Broadcast Aman | 30 | 30 | 20 |
| Transplanted Aman | 40 | 40 | 20-40 |
| Boro Rice | 40 | 40 | 20 |
| Sugarcane | 100 | 60 | 40 |
| Jute | 40 | 20 | 40 |
| Wheat | 30 | 30 | 0-20 |
| Potato | 150 | 100 | 100 |
| Tobacco | 70 | 20 | 40 |
| Maize | 90 | 40 | 60 |
| Vegetables | 150 | 30 | 30 |
| Banana | 150 | 75 | 100 |
| Pineapple | 120 | 75 | 100 |
| Mustard | 20 | 30 | 15 |

Table 9.7
Labour Requirement Per Acre

| Sl. No. | Name of Crops | Yield per Acre (kgs) | Labour Requirement (in man-days/acre) |
|-------------------|----------------------------|----------------------|---------------------------------------|
| <i>Cereals :</i> | | | |
| 1. | Transplanted Aman Rice HYV | 658 | 89 |
| 2. | Broadcast Aman rice Local | 421 | 71 |
| 3. | Transplanted Aus Rice HYV | 736 | 101 |
| 4. | Broadcast Aus Rice Local | 263 | 72 |
| 5. | Boro Rice HYV | 763 | 115 |
| 6. | Boro Rice Local | 526 | 74 |
| 7. | Wheat | 728 | 57 |
| 8. | Maize | 1376 | 65 |
| <i>Beverage :</i> | | | |
| 9. | Tobacco | 485 | 136 |
| 10. | Betel nut | 270 | 300 |
| 11. | Betel leaf | 2100 | 300 |
| <i>Fibre :</i> | | | |
| 12. | Jute | 728 | 114 |
| 13. | Cotton | 133 | 105 |
| 14. | Fruits; (average) | 4000 | 200 |
| <i>Oilseeds :</i> | | | |
| 15. | Groundnut | 485 | 59 |
| 16. | Soyabean | 485 | 57 |
| 17. | Mustard | 425 | 44 |
| <i>Pulses :</i> | | | |
| 18. | Khesari (Cowpea) | 295 | 42 |
| 19. | Mashkalai | 364 | 29 |
| 20. | Gram | 485 | 40 |
| 21. | Khesari | 283 | 20 |
| 22. | Mungbean | 364 | 33 |
| 23. | Masur | 364 | 36 |
| <i>Spices :</i> | | | |
| 24. | Chillies (Green) | 1316 | 119 |
| 25. | Onion | 3035 | 114 |
| 26. | Coriander | 394 | 46 |
| 27. | Garlic | 1619 | 81 |
| 28. | Turmeric | 566 | 80 |
| 29. | Ginger | 5666 | 82 |
| 30. | Sugarcane (cane) | 26305 | 266 |
| 31. | Vegetable | 3000 | 140 |
| 32. | Sesameum | 334 | 33 |
| <i>Tubers :</i> | | | |
| 33. | Potato HYV | 6070 | 116 |
| 34. | Potato Local | 3035 | 103 |
| 35. | Sweet potato | 4856 | 75 |

Labour Requirements

Labour requirements in traditional agriculture depends very greatly upon the cropping pattern. Each crop naturally has its own labour requirement, but this is not an exact co-efficient. It varies with the soil because of the amount of ploughing required. It varies with the size of the average holding because farm families try and do as much as possible without hiring labour. It varies with the weather since rain or drought can affect the requirement of irrigation or flood-protection. It varies considerably with the method of planting and harvesting. The global long-term average for a crop in Bangladesh should therefore be obtained from the weighted averages for different agricultural regions, but this is not possible in the absence of data from most of these regions. One of the first attempts at accurate measurement of labour requirements was made in the Ganges-Kobadak project area (Shao-cr-Ong 1955). Some more data was gathered by two surveys of the Dhaka University (1956, 1962). The best survey to date is that by Raisuddin Ahmed in Kushtia district (Ahmed 1965). The labour requirement given in Table 9.7 is estimated from the above publications and from unpublished data.

The labour requirement for all crops is estimated upto the point where the product is ready for marketing in a semi-processed stage. Thus for rice it includes harvesting and hauling, and also drying and husking operations but not polishing or parboiling. Labour requirements, especially for harvesting, hauling and further processing varies quite considerably according to the yield level and thus the associated yield has been shown.

AGRICULTURAL DEVELOPMENT

The process of agricultural development is likely to affect land utilization in one or more of three forms : (Rashid 1968)

- (i) increase in the intensity of cultivation ;
- (ii) increase in the economic intensity of cropping ;
- (iii) increase in the use of new technology and new inputs.

The intensity of cultivation (IC) may be measured by an index obtained by multiplying the gross cultivated area (as a percentage of the total land area) and expressing this as a percentage. In other words, the Index of Cultivation Intensity (ICI) = 100 but it is not a very meaningful index, because it does not measure the economic returns per

unit land. A farm with an I.C. of 200%, growing local aus followed by mash, is likely to have a much lower income from crops than one with 150% if HYV T. Aman is rotated on half the area with mustard. In 1982-83, for example, the GCA for Bangladesh was 154% and the NCA was 72%. The ICI was therefore 110.9%. The ICI may go up due to an increase in NCA or GCA or both. Agricultural development may take the form of land reclamation from the sea (as along the coast of Noakhali) or extension of cultivation in marginal area (Haor Basin). In these cases NCA and GCA both go up. On the other hand, when fallow lands are cultivated or single crop areas are multiple-cropped then the GCA goes up, with no change in NCA.

There is some indication that an increase of ICI may be linked to high population densities through the availability of labour. This was tested by a regression run between the GCA, as a percentage of the NCA, and the 1961 population density of various cropping pattern units. The relationship tested was : $GCA = a + b PD$, where GCA is the gross cultivated area and PD is the population density per square mile. Both a and b were significant above the 99% level of confidence. The coefficient of correlation was 0.61 and also significant at the 99% level. The fairly high correlation indicates that density of population has an effect on the cropping pattern and cropping intensity. Given the present level of agricultural technology, population densities of a thousand or more per square kilometre indicates a high intensity of cultivation. The data for Bangladesh suggests that a lower than average population density means lower than average land utilization, measured either as ICI or Economic Intensity. It also suggests that a larger population can subsist on the land if there is an increase in the ICI or Economic Intensity.

All measures of the intensity of cultivation, including the ICI, are concerned only with the superficial land area. The nature of the crops grown is not considered, yet obviously certain crops are far more valuable than others : they need more inputs, their unit price is higher, and often net value added per unit is higher.

Sugarcane and tobacco usually give high returns per unit land, whereas pulses and millets generally give lower returns. Thus a farm with an ICI of 120, growing sugarcane and tobacco, will have a higher economic output than another farm of the same size, with an ICI of 160, but growing pulses and millets. The ICI is no indication of the productivity of the two units. A more satisfactory measure would be the average net value of production per unit area. This may be designated the Economic Intensity of the cropping pattern. The process of development may mean the economic intensification of cultivation,

with a switch from poorer to better grains, or from food crops to cash crops. It may also mean multiple cropping. Economic intensification of cropping also usually means an increase in labour demand.

When population growth strains the economic resources of the traditional village economy, farmers usually have three choices before them :

- (a) increasing the ICI by bringing new or marginal land into cultivation, and / or resorting to multiple cropping of the same land :
- (b) increasing the Economic Intensity by changing the cropping pattern and / or multiple cropping :
- (c) engaging in non-farm work or migrating to a better agricultural area or a city.

How these choices are faced depends both on the psychology of the farmers and the nature of the land. In Feni, for example, the soil is relatively poor but the first choice was acted upon, leading to a high ICI. A change to the second alternative was not possible because of various physical limitations (e.g. shortage of water suitable for jute retting). Thus the third alternative has been pressing upon the farmers with increasing urgency : it has led to considerable and continuing emigration. In Jamalpur on the other hand, the soil is suitable for jute and sugarcane, and the response has been to grow more of both, proportionate to the total, and at the same time to increase the ICI.

A fourth choice, which is a form of the second choice, is the increase of Economic Intensity through a substantial increase in yields per unit. This choice, however, has not figured significantly in traditional agriculture. No doubt, improvements were occasionally made and yields went up, but it was more upon chance than on choice. This fourth alternative is now becoming increasingly important in changing traditional agriculture. In Bangladesh, the growing of cash crops has for long been in a semi-static balance with the growing of food crops. By this is meant that further increases in cash crops are not possible without an increase in food supply, and the fluctuations in cash crop area are dependent upon the fluctuations of food supply. There is some variation in cash crop cultivation but in the long run their acreages are nearly constant in proportion to the total cultivated area : thus, a semi-static balance. Increase in food supply through the

first two choices is possible, but it will be slow in relation to the rapidity of the increase in demand. Only the fourth choice, in combination with the first two, can provide the dynamism necessary to shift the semistatic balance.

Significant increases of yields are generally associated only with an increase in non-labour inputs. Labour, it is assumed, is in excess anyway. In many cases this may not be so. An increase of yields in rice is now being associated with the spread of dwarf high yielding varieties (HYV), which require intense and careful cultivation, approximating the condition of rice cultivation in Japan. An increase of HYV means a very substantial increase in labour demand. If traditional rice is replaced by HYV, labour demand grows by 20 to 40 percent, depending on the cropping pattern. Further changes can take place if the ICI is raised. If agricultural development can present the farmer with all three choices at the same time (raising ICI and EI and changing over to high yielding varieties) then labour demand can go up considerably.

In Japan, despite high labour productivity, the labour / land ratio is as high as 1 worker per acre (USDA 1965) because of intensive cultivation. If agricultural operations in Bangladesh can be brought up to anywhere near the Japanese level, labour demand will exceed one per acre, since multiple cropping is possible everywhere. To the extent that the net increase in the rural population cannot meet the demand, machinery will be substituted. Increasing the ICI and the EI, while increasing the use of better seed and fertilizers can still lead to the creation of labour absorptive capacity in agriculture. It will be decades before the unemployment and the underemployed can be absorbed into an industrialized system. The growth path has to be modified to give more attention to employment creation. From an examination of the available data on agriculture and demographic patterns it seems evident that labour requirements (and therefore population density) rise with the intensity of cultivation of agriculture.

Absorption of the presently under and unemployed into a productive economic system can possibly be faster and cheaper through investments in agriculture than through heavy reliance on industrial growth. This growth modality is consonant with the experience of other LDC's in Asia.

Agricultural Products

Agriculture is of paramount importance to Bangladesh. Four-fifths of the people depend, directly or indirectly, upon it. Nearly half of the National Product is from the agricultural sector. The great importance of agriculture and agricultural products is often not fully understood because of the pre-occupation with ways and means to promote industrial growth. Even if Bangladesh is substantially industrialised, it will remain very largely dependent upon agriculture, not only because there is not sufficient scope to become highly industrialised, but also because much of the industries, must be based upon agriculturally produced raw materials. Moreover, recent experience has shown that an excessive dependence on outside sources for basic foodstuffs can impinge on national sovereignty.

The importance of the agricultural sector has been stressed in this work because it is dominant in the economy. Agriculture will remain the basis of Bangladesh's economy for a long time to come, and the only way to improve the lot of the majority of its people will be to improve agricultural productivity. In this Chapter all the major crops have been considered in some detail. It is upon the production of these that 110 million people of this land depend. It should be noted that between the annual statistics of BBS and the 1983-84 Agriculture Census there are significant differences in the area of different crops. The census, for example, found the area under pulses to be thrice as much as in the annual statistics.

RICE

Rice dominates agriculture in Bangladesh. It occupies 80% of the gross cultivated area and constitutes 75% of the total produce from all field crops. It is not surprising, therefore, that the economy of Bangladesh is influenced greatly by the fluctuations in the price of rice.

On an average about 10.3 million hectare (25.5 million acres) are under rice cultivation, including multiple cropping. This vast acreage gives Bangladesh an important position amongst the rice growing

countries, accounting for 9% of the world acreage and 5% of the world production. Only China and India have more land under rice, and only these two countries and Indonesia surpass her production.

Almost all the rice grown has been classed as *Oryza sativa* form *spontanea* (Grist, 1959). The floating rice most probably evolved from *Oriza fatua*. This rice, as well as *O. minuta*, *O. officinalis*, *O. coarctata* and others are found wild in Bangladesh, and many scholars consider the lowlands of Bengal as the origin of cultivated rice. However, genecological analysis by Morinaga (1968) suggests that the Darjeeling-Sikkim Himalayan Zone may have been the original dispersal zone for cultivated rice. Morinaga found that Asian rice could be differentiated into four distinct ecospecies: Japonica, Bulu, Aus and Aman. Ecospecies Aman includes ecotype Aman and Boro from Bengal and Chereh from Indonesia. Aus shows medium to high fertility with all ecotypes and the Aus grown in the Hill Tracts is probably similar to the types grown in the sub-Himalayas. Rice cultivation may, therefore, have begun in the hills of the Assam-Bengal area and been carried into South-East Asia through the migration of the proto-Mongoloids.

The Bengali nomenclature for the growing plant and the grain is distinctive. Rice when in seed is called Bij or Chon; when it germinates, Ankur; the young plant is Jawali; the full grown plant Dhan-gach; just before it is in ear, Thor; when in ear, Phula; when the ear is empty, Chita; unhusked paddy is known as Dhan; uncooked rice as Chal and cooked rice as Bhat.

There is a certain amount of confusion about the exact meaning of the words paddy and rice. Paddy is the unhusked, and rice the husked, grain. The usual conversion rate from paddy to rice is 66 percent; that is to say, rice is considered to be 66 percent of the weight of the paddy. Paddy is often called rough rice and rice is more clearly named as cleaned rice. The figures of rice yield mentioned in various Government publications often do not make clear whether they mean paddy or rice. Yields are usually stated in terms of rice.

Since the spread of dwarf, High Yielding Varieties (HYV's) in the late 1960's there are seven main and three minor genotypes of rice in Bangladesh. They are - Shail, HYV Aman, Jali Aman, HYV Aus, Local Aus, Hill Aus, Local Boro, HYV Boro, Rayada and Bhadoi. These groups are differentiated by their varieties, their plant size and yield, their topographical requirements, and their harvesting time. Shail, HYV Aman and Jali Aman are classed as the Aman group. Rayada rice, grown in a few places in the delta region, is also classed as Aman. HYV Aus, Local Aus and Bhadoi are classed as Aus, Boro, both local and HYV, is in a class by itself.

Table 10.1
High Yielding Varieties of Rice

| Designation | Pedigree | Season(s) | Yield (t/ha) | Year of release |
|-------------------|-----------------------------|------------------------|-------------------------------|-----------------|
| IR8 | IR8-288-3 | Boro Aus | 5.0-6.5 3.5-4.0 | 1967 |
| Purbachi | Chen-chu-ai (from China) | Boro Aus | 3.5-4.5 3.0-4.0 | 1968 |
| IR5 | IR5-47-2 | T. Aman | 4.0-4.5 | 1969 |
| IR20 (Irrisail) | IR532-E576 | T. Aman | 4.0-4.5 | 1969 |
| BR1 (Chandina) | IR532-1-176 | Boro Aus | 4.5-5.5 3.5-4.5 | 1970 |
| BR2 (Mala) | IR272-4-1-2 | Boro Aus | 5.0-5.5 4.0-4.5 | 1971 |
| BR3 (Biplab) | BR27-10-1 | Boro Aus T. Aman | 5.5-6.5 4.5-5.0 4.5-5.0 | 1973 |
| BR4 (Brrisail) | BR51-91-6 | T. Aman | 5.5-6.5 | 1975 |
| BR5 (Dulhabhog) | Pureline | T. Aman | 2.5-3.0 | 1977 |
| BR6 (IR28) | IR2061-214-3-8-2 | Boro Aus | 4.0-4.5 3.0-.5 | 1977 |
| BR7 (Brribalam) | IR2053-87-3-1 | Boro Aus | 4.0-4.5 3.0-3.5 | 1977 |
| BR8 (Asha) | BR167-2B-9 | Boro Aus | 5.0-5.5 4.0-4.5 | 1978 |
| BR9 (Sufala) | BR169-1-1 | Boro Aus | 5.0-5.5 4.0-4.5 | 1978 |
| BR10 (Progoti) | BR51-46-5-HR65 | T. Aman | 5.5-6.0 | 1980 |
| BR11 (Mukta) | BR52-87-1-HR88 | T. Aman | 5.6-6.0 | 1980 |
| BR12 (Moyna) | BR161-2B-58 | Boro Aus | 4.5-5.5 4.0-4.5 | 1983 |
| BR14 (Gazi) | BR319-1-HR28 | Boro Aus | 5.0-6.0 4.0-5.0 | 1983 |
| BR15 (Mohini) | IR2071-199-3-6 | Boro Aus | 5.0-5.5 4.0-4.5 | 1983 |
| BR16 (Shahibalam) | IR2793-80-1 | Boro Aus | 5.0-6.0 4.0-4.5 | 1983 |
| BR17 (Hashi) | Kn-lb-361-1-8-6-10 | Boro | 5.0-5.5 | 1985 |
| BR18 (Shahjalal) | B54lb-Kn-22-7-2 | Boro | 5.0-5.5 | 1985 |
| BR19 (Mangal) | BR2360-2-3-1-9-1-MB-1 | Boro | 5.0-5.5 | 1985 |
| BR20 (Nizami) | BR201-193-1 | Upland Aus | 3.0-3.5 | 1986 |
| BR21 (Niamat) | BR1656-22-1 | Upland Aus | 2.5-3.0 | 1986 |
| BR20 (Kiron) | BR539-17-4-3-3-1 | T. Aman | 4.5-5.0 | 1988 |
| BR23 (Dishari) | BR716-7-2-1-1 | T. Aman | 4.5-5.5 | 1988 |

Source : Miah, S. A. and M. A. Mannan

High Yielding Varieties (HYV)

The most significant recent development in agriculture has been the introduction and spread of various High-Yielding Varieties. These varieties are usually dwarf, and owe their origin to crosses between the short Japonica type and the taller Indica type. The first HYV to spread widely was IR-8, introduced in 1966. The initials are derived from the International Rice Research Institute (IRRI) at Los Banos in the Philippines. Since 1970 the HYV's released to the farmers are the result of breeding and selection at the Bangladesh Rice Research Institute (BRRI) at Joydebpur about 25 km. north of Dhaka. Table 10.1 lists the HYV's released till 1988. One variety not listed in Pajam, a Malaysian cross, which has not been accepted by BRRI as suitable for release, but has proved successful with farmers in the eastern districts. It is medium to high yielding and taller than most HYVs. About 2 mha* are given to HYVs, including Pajam. Of this HYV Aman is grown on 0.85 m.ha million, HYV Boro on 0.75 mha million and HYV Aus on 0.40 mha million. Whereas, Boro HYVs are all irrigated, most of the HYVs in Aman and Aus seasons are grown in rainfed conditions. Statistics on area given to HYVs are approximate, with the possibility of over estimation.

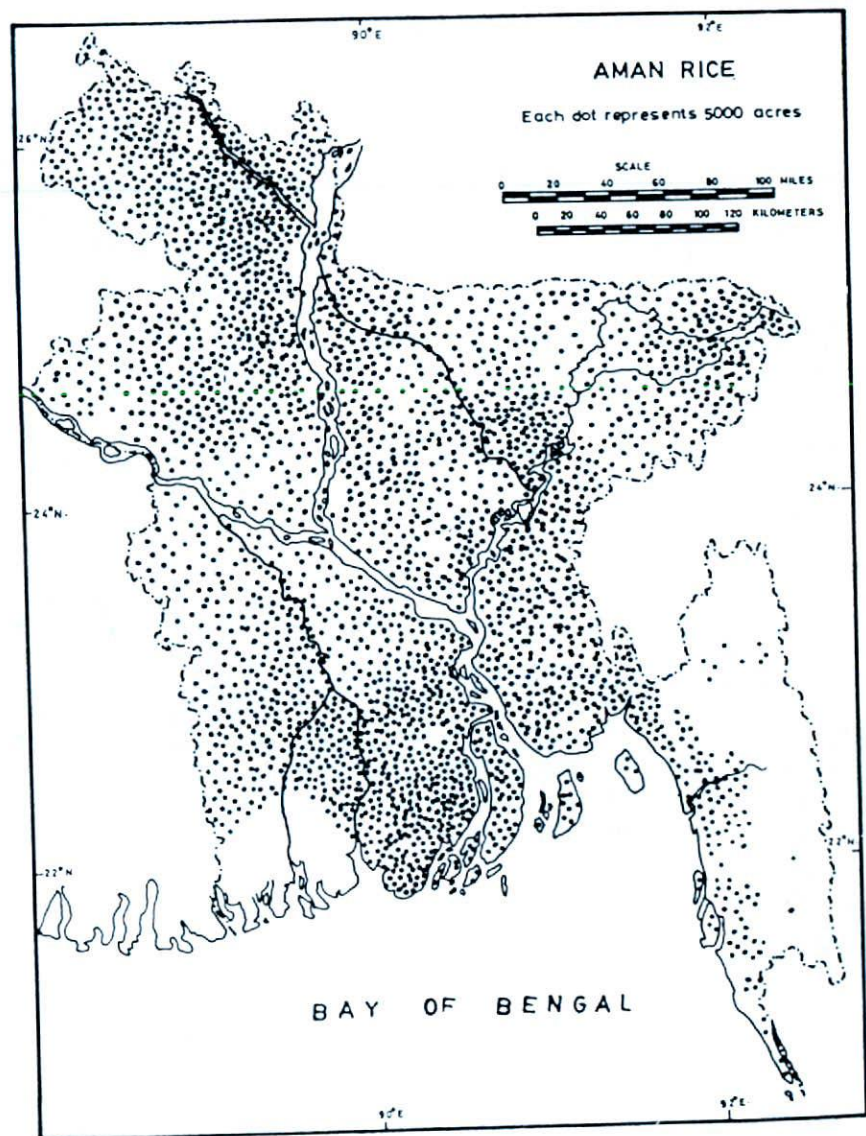
The non-HYV groups consist of many varieties, most of which are based upon whether the grain they yield is fine, medium or bold. This quality in the grain is determined by the proportion of its roundness to its length. When the length to width ratio is 2 to 1, the grain is considered bold. The thinner and longer it is, the finer the grain, the higher its market price. Though the farmers prefer bold varieties for themselves, they grow, if they can, finer varieties for the market.

Shail (Transplanted Aman)

Shail consists of the local varieties of Transplanted Aman. (T. Aman). It normally covers million of land, and thus accounts for 34% of the total area under rice (Map 10.1). Most of the finest and the high yielding varieties belong to this group. The seedling of all Shail varieties are grown in nursery seed beds, known as Chara. These Charas are usually manured with cow-dung, ash and compost. They are prepared carefully and often a pit is dug in one corner to drain off excess water. Since an acre of Chara can provide enough seedlings for 6 to 8 ha, they are usually from 10 to 40 sq. metre in size. The seeds are sown thick, at the rate

* 1 acre = 0.4047 Hectare

Map 10.1



of 230 to 270 kg. (500 to 600 lbs) per acre in June or July. Because of the ample rainfall in this period, no irrigation in 5 to 6 weeks is done. In the second half of September when the Charas are free, some Rabi crops are often sown in it.

The seedlings are transplanted in July or August. Where Aus is grown before Shail on the same field, they are ploughed for Shail as late as July. Six ploughings and ladderings are thought to be necessary. They are done at intervals of a few days in order to kill the weeds and aerate the soil. The seedlings are pulled up from the Chara, tied in bundle (Guchi) and carried to the fields, which are all of medium or high level. Men usually do all the hard work of transplanting. The water level is regulated by opening and closing the Ails. When there is too much rain water, it does not drain off easily and may even flood over from the lower fields. In those areas which receive silt from overflowing rivers, very little manuring is done. In other areas cow-dung, mustard cake and bone-meal are used. The use of chemical fertilizer, especially Urea, is widespread and increasing.

Shail rice has a date-fixed photoperiod. It flowers in October and is harvested from November to January, depending on the variety. The monsoon ends during its flowering period. The fields are dry when the crop is harvested, which is done everywhere by the common sickle. Because of its long growing period and its flowering and ripening during many days of clear sunshine coupled with cool nights (Ramiah, 1954), Shail yields are the highest amongst all the groups. Yields of 1360 kg (3000 lbs.) paddy (816 kg. of cleaned rice) can be obtained from local varieties. The average yield is around 590 kg. (1,300 lbs.) of cleaned rice per acre. Recently IR-20 has proved very successful as a Shail crop. Yields, even without optimum fertilizer application, have averaged 1452 kg. (3,200 lbs.) per acre. The production of Shail rice averages about 4.3 million tons per annum.

Aman Hyv's

The main HYVs grown in the Aman season are IR-20, Chandina, BR-3 and BR-4. Average yields range from 900 to 1360 kg (2000 to 3000 lbs) of cleaned rice per acre. Fluctuation in yield is mainly due to their cultivation under rainfed conditions. HYV Aman is double-cropped with HYV Aus in central and southern Sylhet, eastern Comilla, eastern Noakhali, most of Chittagong, northern and western Mymensingh, northeast Dhaka, most of Bakerganj, eastern Dinajpur, northern Bogra and most of Rangpur. Average annual production of HYV aman is about 3.5 million tons.

Jali-Aman (Broadcast Aman)

The other important Aman type is the Jali-Aman, but its cultivation is decreasing, and average annual production is about 1.3 million tons. It is also known as 'Floating Paddy' and 'Deep-Water Paddy'. Its official name is Broadcast Aman (B.Aman). This type covers nearly five million acres, most of it in the vast low lying areas in the centre of the delta. Considerable quantities are grown in the Haor Basin and the Bhar Basin. In all the areas where the monsoon flooding is normally about a metre or more in depth, this group is of great importance, because no other crop can be grown there in summer. There are three classes of Jali-Aman, differentiated by their ability to withstand flooding. The shallow flooding varieties grow in 1 to 1.5 m of water, the medium varieties grow in 1.8 to 2.4 metre (6 to 8 feet) water, and the deep varieties can grow in water upto 3.6 metre (12 feet) in depth. The peculiarities of the Jali-Aman varieties are that they can grow in deep water, withstand submergence and throw out nodal branches which even produce ears. The long thin stems may attain a length of upto 6 metre (20 feet).

Jali-Aman lands are usually clay, clay loam or silty clay in texture. These soils get quite hard in early summer, and thus are ploughed and prepared for the next crop as early as January. The paddy straw of the previous crop is invariably burnt, thus not only fertilising the soil but also preventing an outbreak of the ufra disease. The land is ploughed 4 to 5 times. This, in large measure, kills all aquatic weeds

The seeds of the Jali-Aman are sown broadcast (i.e. by scattering them by hand) in March or April. The fields begin to get flooded by the middle of May. Little or no manuring is done. In the lowest fields, manuring is, of course, not possible. This rice is plagued by aquatic weeds, especially water hyacinth (*Eichornia crassipe*) and Shapla (*Nymphaea stellata*). Whenever possible, bamboo barricades are built against an "invasion" of water hyacinths.

Jali-Aman flowers from August to November. The early ripening types are ready for harvesting in September. They are usually grown in shallow flooded land, the medium ones in medium flooded land and the late types in the lowest land. The early and the late ripening types are low yielding, giving only about 250 kg. (550 lbs.) of cleaned rice per acre. The medium types average nearly 363 kg. (800 lbs.). The average yield is 304 kg. (670 lbs) per acre. Jali accounts for 1.6 million tons of cleaned rice.'

A very minor group of rice, known as Rayada, is usually classed with the Jali-Aman. Rice of this group is sown in January as a mixed crop with Boro rice. While Boro is harvested in May, Rayada is harvested

in the following December. The reason for classing this rice with Jali-Aman is that this too is a long-stemmed rice and has its growing period in late summer. Fields are as low as for Jali-Aman.

Aus

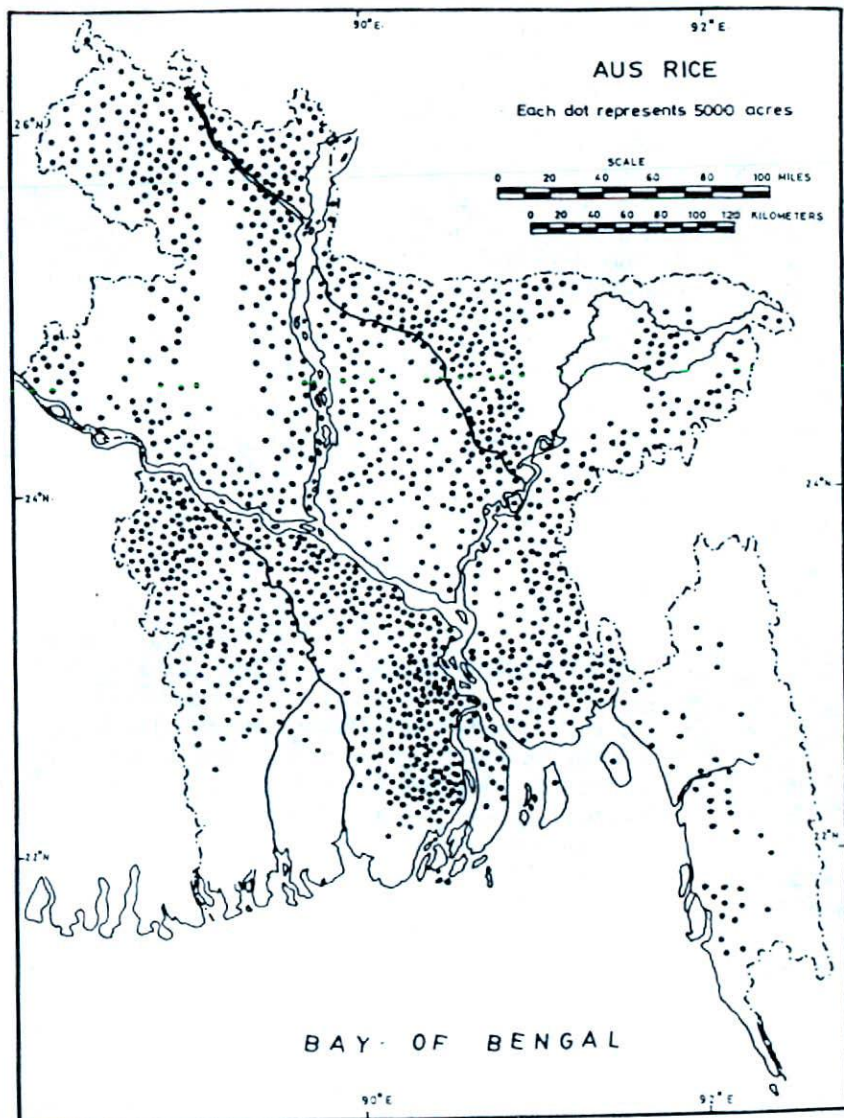
Of the Aus rice types, Local Aus, sometimes classed as Highland Aus (Alim 1956) is widely grown. Bhadoi rice is grown in a few places by the edge of the Bils. It is sown broadcast in the low lying lands in February or March and with subsequent inundation, the plants grow with the rise of water. It is harvested from boats in August and September, when the water in these fields is still 1.5 metre (5 feet) or more in depth.

Local Aus is an early maturing type, taking from 80 to 120 days to ripen. The fields are ploughed 6 to 8 times in early summer and seeds are broadcast in March, April or May at the rate of 36 kg. (80 lbs) per acre. In a few areas the rice is transplanted. This crop depends very greatly on the monsoon rains. In many areas, Aus and Aman are sown together to ensure that at least one crop is harvested. After the Aus is harvested, the Aman continues to grow and is harvested several months later. Manuring of Aus fields with cow-dung is quite common in all places. The crop is harvested from May to August, depending on the variety. This rice crop is especially plagued by weeds, mostly of the Graminae family. *Oryza fatua*, wild rice which shatters on ripening, is the most troublesome of the lot. Weeds can reduce the yield of an affected plot by nine-tenths. In the absence of weeds, yields are generally low, averaging around 330 kg. (730 lbs) of cleaned rice per acre. When grown as a mixed crop with Aman, the yield is rarely above 272 kg. (600 lbs) per acre. The two Aus types cover over 7.7 million acres (Map 10.2) and account for the production of over 3 million tons. The rice in Jhum cultivation is also classed as Highland Aus. At the foot of the hills in the Chittagong Sub-Region and the eastern border of Noakhali district very early Aus cultivation is practised. It is sown in late January or February and harvested in late April or May. This crop is locally known as Pani-Aus. Production of Local Aus averages 2 million tons annually.

Aus Hyv's

HYV varieties have not done very well in the aus season. The main varieties grown are Purbachi, Chandina, Mala and Biplob. More than half the area grown to Aus HYVs is in the double cropped areas of Sylhet, Comilla, Noakhali and Chittagong. Average annual production of HYV Aus is about 1 million tons.

Map 10.2



Boro

The group assuming increasing importance is the Boro or Spring rice. Local and HYV Boro is grown on 2.2 million hectares (over 5 million acres) and produces about 6 million tons of cleaned rice (Map 10.3). It is of special importance in the Haor Basin, because there rice of other groups cannot be widely grown. The seed beds for Local Boro are prepared in October and November, and the seeds are sown at the rate of 227 kg. (500 lbs) per acre. Within five weeks of sowing, the seedlings are transplanted. The fields are ploughed thrice and all aquatic weeds removed. The transplanting lasts almost a month. Three or four seedlings are planted at 15 cm (6 inches) intervals. Because of the low-level of most Boro lands, aquatic weeds are common. They have to be removed by hand. Like the Mayin paddies of the Upper Burma, Boro can stand low temperatures. The average minimum temperature in the Haor Basin in early January is 9.5°C.

Boro has to be irrigated from January to March. It is harvested in April. The yield of this group is usually better than that of the other groups as it averages 726 kg. (1,600 lbs) of cleaned rice per acre. Since Boro is the only rice that grows in winter, its cultivation is being extended. Average production of Local Boro is 0.4 million tons annually.

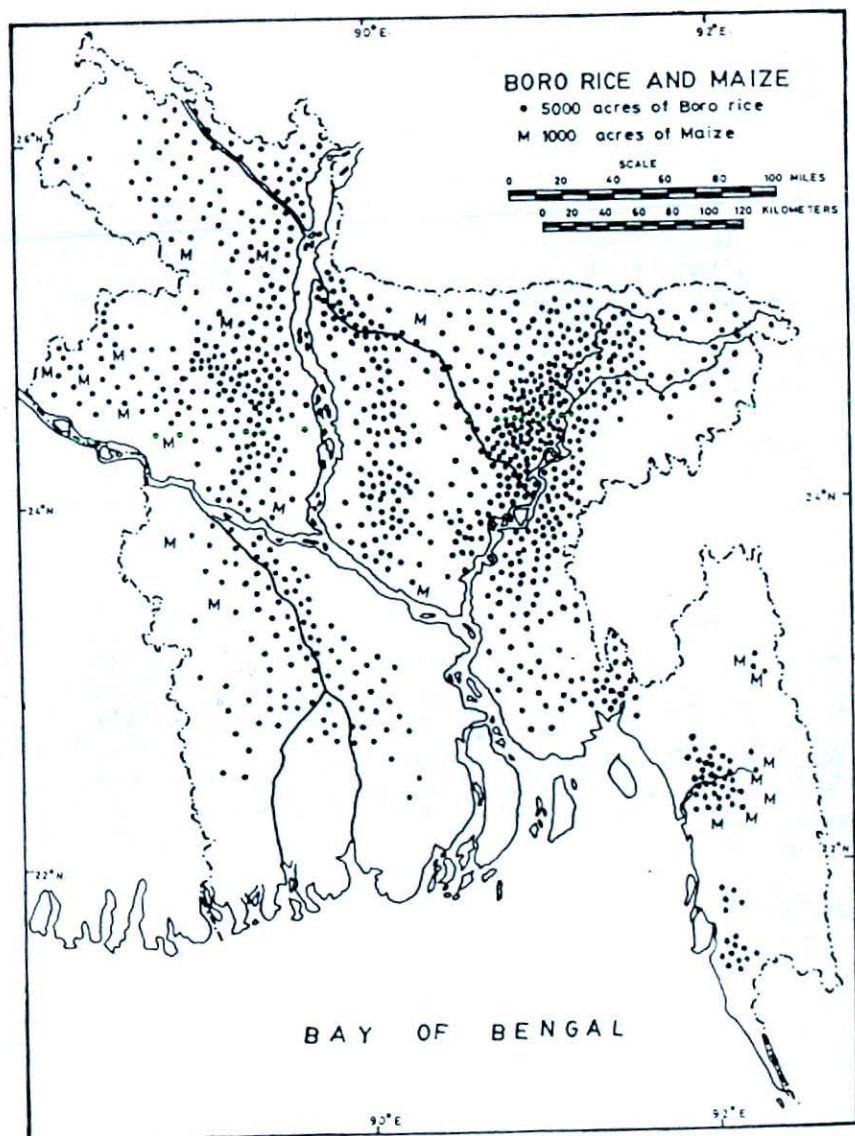
Boro Hyv's

IR-8 remains the favourite variety because of its high yield potential. Since Boro HYVs are irrigated, the average yields are consistently over 1360 kg (3000 lbs) of cleaned rice per acre. Boro HYVs are grown in most parts of the country, especially where irrigation is from tubewells and low-lift pumps. Their low height makes them unsuitable for the deeper-flooded slower-drained areas of the Haor Basin. Production of HYV Boro has increased very rapidly since 1986 and now averages 5.5 million tons annually.

Section II

There are three special ways of rice planting which, though practised in small areas, are worth mentioning. In parts of Noakhali, Chittagong and Thakurgaon districts, Aus is sown in drills. On the low silt Chars of the Padma and Meghna, direct sowing (Lepy) of Shail is common. In this method germinated seeds are broadcast on the wet fields which are not even ploughed. The varieties grown are very early maturing : sown in September, they are reaped in December. In contrast, is the double transplantation practised in the western parts of the Haor Basin and

Map 10.3



the eastern parts of the Tista-Dudhkumar plain. In the former, Boro and in the latter, Shail is raised in nurseries. When five or six weeks old, they are transplanted in bunches on the Ails or along the edges of the Haor or Bil : another five or six weeks later, when the water has receded sufficiently, the seedlings are planted in the fields. This method gives better yields than a single late planting.

It is an interesting fact that in 336 out of 409 Upazilas, the Aman group predominates, Aus leads in 34 Upazilas and Boro in 10. In 22 Upazilas Aman and Aus groups occupy nearly the same acreage, in 4 Upazilas Aman and Boro attain approximate equality. The great importance of the Aman crop is obvious. It is the leading crop over four-fifths of the land. Several thousand varieties of rice are grown in Bangladesh. Such a large number is the result of the recognition of very minor and often insignificant variations in size, colour or even taste. Proper classification could possibly reduce the number of varieties to a few hundred.

In the Piedmont plains the main Local Aus varieties are Duni, Tana, Gorbai, Sani, Biluji and Panbira (FAO No. 545), and the average yield per acre is 295 kg. (650 lbs) of rice*. The main Shail varieties are Dudh-kalam, Dighalsaru, Indrashail (FAO No. 335) and Daudkani (FAO No. 525). The last mentioned is a fine rice and commands a higher price than the others. The average yield is 408 kg. (900 lbs). HYVs being grown are Birrishail, Chandina, IR-8 and IR-20. Further east, in the Lower Tista-Dudhkumar plain, the main Shail varieties are Malsira, Naikalam, Dudhkalam, Jasoya, Kansahar, Kartikshail, Indrashail, Tolkaphul and Rupshail (FAO No. 552). The yield is 435 kg (960 lbs.). Jali-Aman is sown with Local Aus in the Chars of the Brahmaputra, Jamuna, Tista, Jaladhaka and Qudhkumar in the proportion of 2/3 Aman and 1/3 Aus, or is grown singly in Bils. Its main varieties are Bangaldhara, Dhepa, Bheto, Kandha and Kandoshao. The yield is about 272 kg (600 lbs.).

The main Shail varieties grown in the Barind Tract are Biraganjia, Changa, Gajalgari, Malsira, Supandari, Indrashail, Daarikashail and the high priced, fine grained Kataribhog. The last mentioned is mainly grown in Parbatipur and Gobindaganj upazilas. The yield is 408 kg. (900 lbs). Local Boro is grown in the katal area of the Barind : the average yield is a good 544 kg. (1,200 lbs). In the West Jamuna Plain, the main Aus varieties are Kanchamani, Garhia, Balam, Ranjana, Samudrafena, Sarshabuti and Kataktara (FAO No. 538). The yield is 272 kg. (600 lbs). The Shail varieties include those grown

* All regional yields given hereafter are of rice per acre, and are obviously approximates.

in the north and also Khuman, Lohadanga, Shaita, Pakhra, Dunkamari, Saralbansi, etc. The average yield is 408 kg. (900 lbs). Jali-Aman is grown fairly extensively in Dhunot, Shariakandi and Gabtoli Upazilas. The main varieties are Dhepa and Hanskol, whose average yield is 272 kg. (600 lbs).

In the north Ganges levee, the main Local Aus varieties are Kachinapaju, Shaitia, Marichbuti (FAO No. 542), Hashikalmi (FAO No. 533) and Dhalashaita (FAO No. 527). The average yield is 363 kg (800 lbs.). The Shail grown includes such varieties as Chenga, Dudhkalam, Indrashail, Malsira, Gopalbhog, Bansphul and Jhingashail (FAO No. 537). The average yield is 363 kg. (800 lbs). In the Bhar area, Jali-Aman known here as Baran is grown extensively, the yield being 227 kg. (500 lbs) only. Jali-Aman and Aus are grown mixed over nearly 30% of the cropped area. Mostly Mathan (low) level fields are so cropped. HYVs being grown are IR-20, Chandina and China.

In a large area of the north-west of the Southern Region, Local Aus and not Shail is the major type grown. Some of its varieties are Kalamanik, Baol, Kalia, Pakkhiraj, Lohasail, Panbira, Atlai (FAO No.517), Pashpai (FAO No.546) and Kumari (FAO No.539). The average yield varies from 635 kg (1,400 lbs) in the higher areas of Jhikargachha and Mahespur Upazilas to 227 kg (500 lbs.) in the higher areas of Sailkupa Upazila. The Aman group is more important than the Aus in east of Jessore town. The predominance is lesser of the higher lands than on the lower. Throughout the west of the Southern Region, the main varieties of Shail are Malbhog, Kalomomegh, Kartikshail, Meghanal, Kaikatari, Ramshail, Keshail and the scented fine-grained Gobindabhog. The average yield varies from 590 kg. (1,300 lbs) in the better land so Manirampur and Abhoynagar Upazilas to 272 kg. (600 lbs.) in Magura Upazila. HYVs being grown are Chandina, China, IR-20 and Biplob.

Jali-Aman is grown extensively in the central and eastern parts of the Southern Region, some of the varieties being Ashini, Goda Amon, and Khamax. Jali-Aman is often called Boro-Aman or Bhasha - Naranga in this area. The average yield is around a mere 272 kg. (600 lbs.) in the Bil area of south-west Southern Region. Boro and Rayada rice is often grown together in the proportion of five-sixth to one-sixth. The yield is upto 680 kg. (1,500 lbs) Mixed cropping, but of Aus and Jali-Aman is also widespread along the Gorai-Madhumati and in the north-east of the Southern Region. In the higher lands of the northern part and almost throughout the southern side of the Southern Region, Shail is very much the chief type. In some places, such as Kalapara and Amtoli Upazilas, rice

occupies 99% of the gross cultivated land, and it is entirely Shail. A large number of good varieties are grown. The Balam group from Barisal has a high reputation. Its chief varieties are Chingrighushi, Khiraajali, Bansphul and Sessobalam (FAO No. 536). Other chief varieties are Agrahan, Saitia, Patni (FAO No. 547), Tikachari (FAO No.554), Dudshar (FAO No.530), Bhashamanik (FAO No.520) and Rajashail (FAO No.551). In the southern most Upazilas, the transplantation is done in September and harvesting in January. The yield there can be as much as 816 kg.(1,800 lbs.), but with the steady deterioration of the land due to saline water ingress, the average now is probably 430 kg. (950 lbs.). In the other parts, the average is 408 kg. (900 lbs.) Aus is a minor crop in these areas. Its chief variety is Patuakhali (FAO No.548), which is a Bhadoi Aus, being able to stand 1.8 metre (six feet) of flooding. The average yield of Aus is low, estimated at 227 kg. (500 lbs) and HYVs have not spread in the saline zone, but further north IR-8, IR-20, Chandina are grown.

In the Central Region, Jali-Aman is widely grown in the Padma and Dhaleshwari Doabs, the lower areas of the East Jamuna Plain and West Meghna Plain and the Bils in north Mymensingh district. The main varieties are Bateshar, Asshini, Goda-Aman, Khama, Lakhibilash, Shalpatha, Baishbish (FAO No. 519), Gabura (FAO No.531), and Maliashangor (FAO No.541). The average yield is only 272 kg. (600 lbs). Shail is the main type on medium level lands, its chief varieties being Chaplash, Indrashail, Gobindabhog, and Badshabhog (FAO No.518). The average yield is 408 kg. (900 lbs). Aus is nearly as important as Shail in the Old Brahmaputra Valley because of the generally high level of the land. Its chief varieties are Pokkhiraj, Boaljuri, Kalamanik, Garfa, Kataktara (FAO No. 553) and Pukhi (FAO No. 550). The average yield is 272 kg. (600 lbs.) which is unexpectedly low for an area which seems quite suited to this group. HYVs grown are IR-8, IR-5, IR-20, Birrishail, Chandina and Biplob.

In the Haor Basin, Jali-Aman is grown on the edges of the Haors, for they can stand the flood at that level. The main varieties grown are Parisok, Badal, Goyari, Kalakura, Hiramon, Katya Bagdar (FAO No. 561), Godalaki (FAO No. 559), Dudhlaki (FAO No.558) and Dhola-Aman (FAO No. 557). The average yield is 363 kg. (800 lbs.). Boro is, of course, the main group here, predominant in thirteen Upazilas. It is divided into three classes, Shail Boro, HYV Boro, Local Boro, of which the latter can grow in deeper water, and so is planted in the lower levels of the Haors. Shail-Boro varieties are Barashail, Haranarate, Tepi (FAO No.654), Banajira (FAO No.556) and

Pushushail (FAO NO.563). The average yield is 499 kg. (1,100 lbs). HYV Boro grown is mainly IR-8. Local and HYV Boro is cultivated in the Baidis of the Madhupur Tract.

In the middle Surma Valley (east Sylhet), Shail is once again the main type of rice. Its main varieties are Torab Ali, Balam, Khai and Thakurbhog. The average yield is 454 kg.(1,000 lbs) . Local Aus too is grown, of which the main varieties are Dumahi, Chengri and Hati. A Bhadoi Aus, Murali, is also grown. The average yield is 340 kg. (740 lbs). HYVs grown are mainly IR-8 and IR-20.

In the Tippera Surface and the plains of the Chittagong Sub-region, both Shail and Aus are important and double-cropping from the same field is common. Some of the Shail varieties are Indrashail, Dudshar, Betickhikon, Rajshail, Hatishail (FAO No. 534), Latishail (FAO No.540) and Nazershail (FAO No.544). Rajashail is the main variety in the islands of the Meghna Estuary. The average yield is 408 kg. (900 lbs.). Main HYV Aman varieties are IR-20 and Chandina. The main varieties of Local Aus grown are Chandramuni (fine-grained), Phulbadam, Chiknal, Kalamuga, Lohaigiri, Harinmuda (FAO No. 532), Hashikalmi (FAO No. 533), and Dharial (FAO No. 528). Latishail, Nazershail and Dharial varieties can with fertilisation and irrigation, yield over 1360 kg (3,000 lbs) per acre. Main HYV Aus being grown here are China, Chandina and Pajam.

In the Jhum fields of the Hill Tracts Hill-Aus is grown (see Chapter VI Forests). The chief varieties are Golong : Rangi, Koborak, Boro Badoja, Gelangdo, Taki, Kamrang and Binni. The average yield is probably around 408 kg. (900 lbs.).

Section III

Pests, diseases and weeds often reduce the yields of rice quite dramatically. Since in many places, rice is grown practically throughout the year, they can flourish in all the seasons. It is difficult to say which of the three : pests, diseases and weeds : is the more destructive. Their destructive intensity varies from locality to locality and from season to season. It is thought that on the whole, pests and diseases are equally destructive and weeds are worse than either. There are eight pests which are most troublesome : Stemborer (*Schoenobius bipunctifer*), a Chrysomelid Beetle (*Hispa armigera*), a Grasshopper (*Hieroglypus banian*), rice swarming Caterpillar (*Spodopter mauritia*), Rice Case Worm (*Numphula depunctalis*) and Rice Leaf Hopper (*Nephratettix bipuntalus*). Usually their outbreak is scattered over a few acres here and there, but the total damage they do is considerable. When the ears begin to

ripen. a number of other pests attack them. In some areas, the house crow (Kaak) (*Corvus s. splendens*) and the jungle crow (*Corvus m. macrorhynchos*) prove very destructive. The house sparrow (*Passer domesticus indicus*), the common Shalik (*Acridotheres tristis*) and the Talhabai (*Paloceus philpinus*) damage stored paddy. Shail and Boro rice are damaged in the field by ducks and Rice Bug (*Leptocorsia acuta*), Rice Ear-Cutting Caterpillar (*Pseudaletia unipuncta*). Geese, amongst which the bar-headed geese (*Anser indicus*) figures prominently. More destructive than birds are the field rats (*Mus budava*), the house rats (*Mus musculus*) and the Bandicoot (*Nesocia nemorivaga*). Their control is very difficult especially because so much of the crop is stored in Kacha houses and Dhan Golas (rice bins).

Diseases of the rice plants are many and they cause considerable damage. An epidimic attack of *Helminthosporium* disease in 1942 is said to have contributed largely to the rice shortages which led to the Great Famine of 1943. Of the diseases which cause at least some damage every year, there are no less than twelve : namely Panshuk (a physiological disease), Blast (*Piricularia oryzae*), Brown Spot (*Helminthosporium oryzae*), Bakanea (*Fuzarium sp.*), Sclerotial disease (*Sclerotium oryzae*), Bunt (*Neovossia horrida*), Narrow Brown Spot (*Cercospora oryzae*), Lead Smut (*Entyloma oryzae*), False Smut (*Ustilaginioda vierns*), Stacknurn disease (*Trychococonis padwickii*), Steam Spot (*Helminthosporium sigmoideum*) and Ufara (*Ditylenchus angustua*). The last of these, Ufara: also called Dak Pora, is the most troublesome. This nematode disease can spread like wild fire. Great vigilance is needed to combat its outbreak, since the affected plants have to be, at once rooted out and burnt, there being no other way to control it.

As if these pests and diseases were not enough, the rice plants are often severely affected by weeds. The broadcast rice fields are more affected by weeds than the transplanted rice fields. Since much of the rice acreage is under broadcast rice (Jali-Aman), weeds are a major cause of reducing yields. More than seventy species of plants have been found to be weeds in rice fields (Alim 1956). Among them the most important are Ghorar Ghae (*Vossia cuspidata*), Thora (*Oryza fatua*), Meoni (*Cyperus flavidus*), Kochuri-pana (*Eichorinia crassipe*) and Shapla (*Nymphaea stellata*). Other common weeds are *Oryza minuta* ; *O. officinalis*, *Saccharum spontaneum* ; *Cynodon dactylon* ; *Ammonia rotundifolia* ; *A. Octandra*, *A. peploides*, and *Bergia verticillata*. Strangely enough *Oryza coarctata* and *O. latifolia* do not seem to be troublesome weeds.

The harvested paddy is stored by the farmers usually in large earthen pots or large baskets. In rice mills and Government godowns, the cleaned rice is stored in jute sacks. Both paddy and rice are attacked during

storage by the *Angoumis* grain moth, rice weevil (*Sitophilus oryzae*) and the granary weevil (*S. granarius*). All of them cause considerable damage.

It is estimated that, on the average, a farmer keeps 10% of his paddy for seed, stock feeding and payment of wages, and 60% for domestic consumption. The remaining 30% is his marketable surplus. The farmer's storage capacity, his short-term debts and the market prices determines how quickly this surplus will be marketed. Generally Aman rice is marketed from February to July, Aus rice in August and September and Boro rice from May to July.

Table 10.2

Acreage & Production of Different Crops of Rice

| Variety of Rice | 1972-82 | | 1987-88 | |
|-----------------|---------|------------|---------|------------|
| | Area | Production | Area | Production |
| Aus | 7,796 | 2,983 | 6,891 | 2,993 |
| Aman | 14,345 | 6,932 | 13,816 | 7,690 |
| Boro | 2,710 | 2,276 | 4,800 | 4,731 |
| Total: | 24,851 | 12,191 | 25,507 | 15,414 |

Source : Agricultural Yearbook, 1989; Statistical Yearbook, 1989; Monthly Statistical Bulletins; B.B.S.

Something like 6 million tons of rice are kept by the land owning farmers for their own consumption and another million tons or more are taken by field hands as part of their wages for harvesting. Some of this is de-husked by one of three types of primitive hullers, Kahal, Dheki and Karikal. The Kahal is a wooden mortar with five-feet long pestle. The Dheki is a mortar with the pestle on a fulcrum worked by foot. The Karikal also called Kriosi, is an introduction of the Arakanese. This implement has a large wooden cone fitted into the cone-shaped hollow of another wooden block. It is worked by moving the handles on the cone piece forward and backward, the grain thus getting hulled by the rubbing of the two pieces. This is a better implement than the other two, since the breakage of rice is comparatively low and the output equals that of the Dheki. Before being de-husked the paddy is often parboiled.

The output of the large number of small and big machine hullers and polishers is some three million tons of cleaned rice. Not only is the paddy hulled, but it is polished to remove the red glume surrounding the grain. This process removes most of the vitamins, but satisfies the finicky taste of rice eaters. The Bengal type of rice cooking results in losses of 15% of the calories, 10% of the proteins, 15% of the calcium and phosphorus and 75% of the iron from the rice cooked. The grain is nearly as nutritious as wheat but after such milling and cooking it is rather poor nutritionally. It may greatly benefit public health if such milling is discouraged and the cooking of rice in lesser quantities of water is popularised.

Table 10.3

Aman

(Area : in acres - Production : '000 tons of cleaned rice)

| Greater District | 1972-82 | Average | 1987-88 | Actual Production |
|------------------|---------------|--------------|---------------|-------------------|
| | Area | Production | Area | Production |
| Dhaka | 703 | 319 | 573 | 258 |
| Mymensingh * | 641 | 352 | 578 | 378 |
| Tangail | 426 | 179 | 387 | 160 |
| Jamalpur * | 513 | 248 | 432 | 227 |
| Kishoregonj | 538 | 288 | 482 | 314 |
| Faridpur | 707 | 221 | 688 | 212 |
| Chittagong | 570 | 377 | 642 | 514 |
| Hill Tracts | 62 | 42 | 54 | 45 |
| Noakhali | 729 | 353 | 601 | 317 |
| Comilla | 895 | 449 | 871 | 497 |
| Sylhet | 1,035 | 492 | 1,048 | 579 |
| Rajshahi | 1,066 | 467 | 858 | 421 |
| Dinajpur | 831 | 435 | 858 | 505 |
| Rangpur | 1,322 | 740 | 1,382 | 868 |
| Bogra | 574 | 377 | 531 | 352 |
| Pabna | 508 | 197 | 262 | 99 |
| Khulna | 941 | 441 | 960 | 525 |
| Barisal | 911 | 396 | 978 | 519 |
| Patuakhali | 630 | 280 | 776 | 410 |
| Jessore | 626 | 276 | 651 | 360 |
| Kushtia | 151 | 71 | 204 | 129 |
| Total: | 14,379 | 7,000 | 13,816 | 7,689 |

Source: B.B.S., *Op. Cit.*

* Four years average

Table 10.4

Aus

Area : in acres
Production : '000 tons.

| Greater District | 1972-82 | Average | 1987-88 | Production |
|------------------|---------|--------------------------|---------|--------------------------|
| | Area | Production clean rice | Area | Production clean rice |
| Dhaka | 400 | 149 | 283 | 109 |
| Mymensingh * | 424 | 233 | 447 | 216 |
| Tangail | 295 | 102 | 193 | 65 |
| Jamalpur * | 310 | 124 | 204 | 87 |
| Kishoregonj | 259 | 101 | 286 | 151 |
| Faridpur | 537 | 144 | 650 | 225 |
| Chittagong | 211 | 124 | 170 | 88 |
| Hill Tracts | 83 | 35 | 46 | 28 |
| Noakhali | 349 | 159 | 358 | 158 |
| Comilla | 451 | 199 | 454 | 209 |
| Sylhet | 369 | 171 | 353 | 177 |
| Rajshahi | 443 | 157 | 295 | 103 |
| Dinajpur | 442 | 167 | 341 | 146 |
| Rangpur | 930 | 307 | 576 | 248 |
| Bogra | 278 | 106 | 78 | 39 |
| Pabna | 333 | 108 | 206 | 75 |
| Khulna | 111 | 48 | 102 | 51 |
| Barisal | 457 | 173 | 576 | 227 |
| Patuakhali | 130 | 46 | 299 | 118 |
| Jessore | 621 | 235 | 553 | 227 |
| Kushtia | 349 | 127 | 419 | 118 |
| Total: | 7,782 | 3,015 | 6,891 | 2,993 |

Source: B.B.S., *Op. Cit.*

* Three years average

The seemingly ideal conditions for rice growing and the general fertile soils should give high yields. This is not so, as has been earlier explained. At an average conversion rate of 65% the average per acre yield of rice is 431 kg. (950 lbs.) in Brazil and 499 kg. (1,100 lbs.) in Malaysia. All these countries grow the Indica variety extensively, but their yields are appreciably over the average 408 kg (900 lbs.) for Bangladesh. The causes of the low yield are (i) insufficient manuring, (ii) use of poor quality seeds, (iii) inherent low yielding capacity of the Jali-Aman, Rayada and Bhadoi types, (iv) pests, (v) diseases, (vi) weeds.

Table 10.5

| Greater District | Boro | | Area : in acres Production : '000 tons. | |
|------------------|---------|--------------------------|--|--------------------------|
| | 1972-82 | Average | 1987-88 | Production |
| | Area | Production clean rice | Area | Production clean rice |
| Dhaka | 241 | 225 | 346 | 331 |
| Mymensingh * | 117 | 81 | 215 | 194 |
| Tangail | 94 | 98 | 205 | 217 |
| Jamalpur * | 82 | 67 | 219 | 222 |
| Kishoregonj | 432 | 331 | 550 | 537 |
| Faridpur | 63 | 63 | 182 | 216 |
| Chittagong | 212 | 291 | 263 | 265 |
| Hill Tracts | 22 | 19 | 23 | 22 |
| Noakhali | 142 | 132 | 187 | 180 |
| Comilla | 232 | 217 | 395 | 437 |
| Sylhet | 584 | 367 | 555 | 351 |
| Rajshahi | 107 | 100 | 294 | 320 |
| Dinajpur | 16 | 16 | 86 | 9 |
| Rangpur | 63 | 55 | 394 | 392 |
| Bogra | 54 | 53 | 348 | 376 |
| Pabna | 52 | 47 | 215 | 219 |
| Khulna | 48 | 33 | 80 | 78 |
| Barisal | 107 | 103 | 50 | 45 |
| Patuakhali | 33 | 32 | 10 | 4 |
| Jessore | 27 | 27 | 159 | 210 |
| Kushtia | 6 | 5 | 24 | 27 |
| Total: | 2735 | 2290 | 4800 | 4652 |

Source: B.B.S., *Op. Cit.*

* Four years average

(vii) floods and/or droughts. In any given area, some or all these causes will tend to lower the potential yield.

WHEAT (Ga-oom)

Wheat (*Triticum sativum*) can be grown only as a winter crop. With the popularisation of wheat bread, both leavened and unleavened, wheat cultivation has increased. In 1975-76, wheat was grown on 400,000 acres.

Table 10.6

Wheat

Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 | Production |
|------------------|-----------------|------------|-----------|------------|
| | Area | Production | Area | Production |
| Dhaka | 24,730 | 13,600 | 91,910 | 64,080 |
| Mymensingh * | 8,500 | 5,200 | 29,425 | 19,890 |
| Tangail | 23,900 | 17,500 | 60,735 | 39,740 |
| Jamalpur * | 10,800 | 8,200 | 60,735 | 37,340 |
| Kishoregonj | 9,200 | 5,200 | 28,285 | 19,350 |
| Faridpur | 51,300 | 27,600 | 120,880 | 74,490 |
| Chittagong | 300 | 160 | 1,350 | 80 |
| Hill Tracts | 100 | 60 | 85 | 45 |
| Noakhali | 1,700 | 800 | 3,455 | 2,010 |
| Comilla | 88,500 | 55,900 | 184,000 | 122,310 |
| Sylhet | 5,260 | 2,900 | 16,360 | 10,525 |
| Rajshahi | 74,200 | 43,500 | 128,065 | 93,210 |
| Dinajpur | 64,900 | 45,600 | 142,585 | 95,525 |
| Rangpur | 79,700 | 61,300 | 186,775 | 131,130 |
| Bogra | 31,100 | 24,200 | 58,635 | 44,360 |
| Pabna | 66,200 | 41,800 | 122,160 | 71,130 |
| Khulna | 6,400 | 5,500 | 8,130 | 6,835 |
| Barisal | 1,800 | 1,000 | 18,215 | 13,840 |
| Patuakhali | 90 | 40 | 350 | 210 |
| Jessore | 49,800 | 31,400 | 110,190 | 104,505 |
| Kushtia | 71,100 | 58,700 | 113,375 | 97,410 |
| Total: | 669,580 | 451,160 | 1,476,290 | 1,048,015 |

Source: B.B.S., *Op. Cit.*

* Three years average

and production was estimated at 265,000 tons. In 1972-82 period on an average wheat was grown on 670,000 acres (263,000 ha) of land and the production was around 451,000 tons. From 1979-80, wheat acreage increased rapidly. In 1981-82 and 1982-83 it was grown on about 1,300,000 acres (512,000 ha) of land and the production was around 1,000,000 tons. The big increase from the 1965-70 average production of 75,000 tons is due to the spread of dwarf high yielding varieties. Wheat is sown in October or November and harvested

in February. The local varieties grown are Dudhia, Jamali, Gangajali, Kheri, Puisa and Nambia. On the west bank of the Jamuna and in the Tista Valley, Spelt (*Var. speltim*), known as Paira, is more common than the ordinary variety. The dwarf high-yielding Mexican varieties, such as Penjamo and Sonora 62, have been successfully grown with or without irrigation. By 1980-81, more than 96% of the area under wheat was under HYVs. The main areas of production are (Map 10.4) the Moribund Delta, the Ganges levees and the Tista and Jamuna plains in the Northern Region, and the south-western part of the Central Region.

BARLEY (Job or Paira)

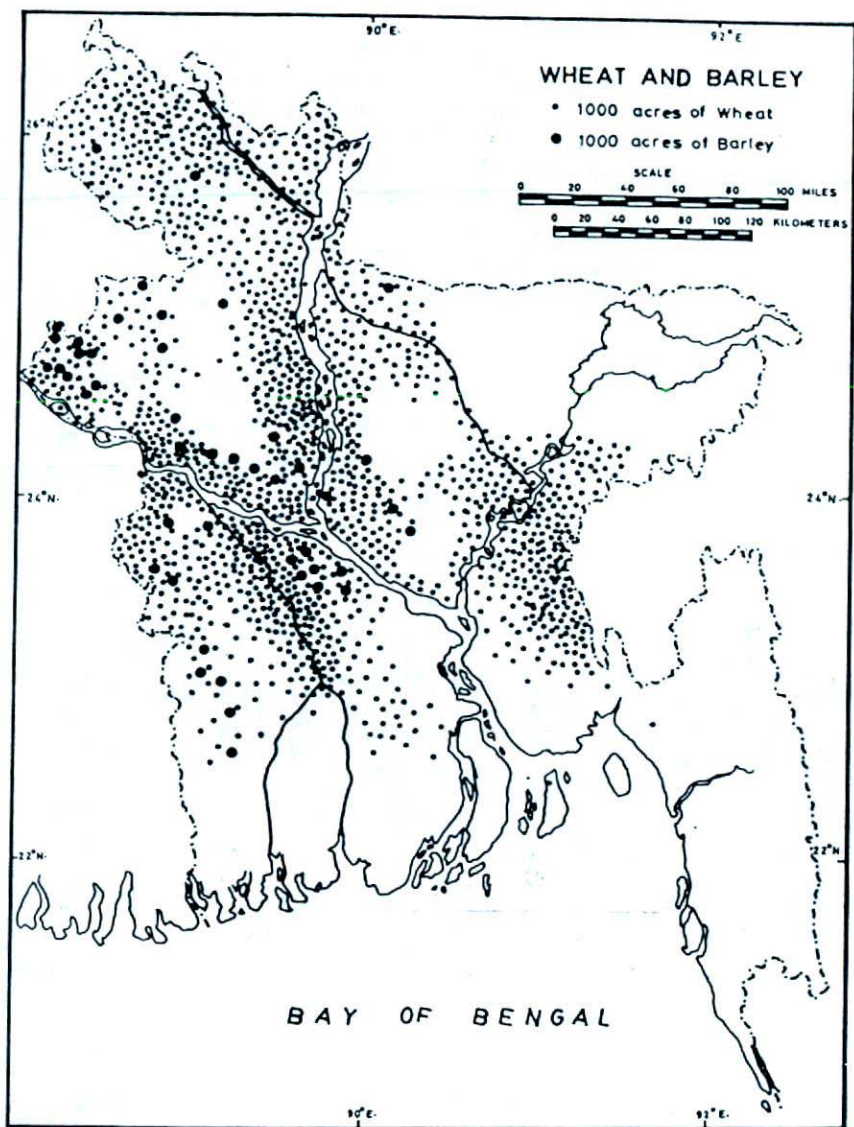
Barley (*Hordeum hexastichum*), is as restricted a crop as wheat. It is sown in October and harvested in March. The yield per acre is slightly higher than that of wheat. Barley is losing its importance. The average annual acreage for this cereal is only 49,000 (19,000 ha) and the production is 12,400 tons. The main areas of production (Map 10.4) are the north-central part of the Southern Region, the Mahananda-Ganges Doab, the eastern part of the Ganges levee of the Northern Region, the sandy areas of the Piedmont plain, the eastern part of the Jamuna plains and part of the Dhaleswari Doab.

Table 10.7

| Greater District | Barley | | Area | Production |
|------------------|---------------|---------------|---------------|---------------|
| | 1972-80 | Average | 1987-88 | |
| | Area | Production | Area | Production |
| Dhaka | 2,476 | 630 | 164 | 58 |
| Tangail | 5,624 | 1,350 | 2,464 | 874 |
| Jamalpur | - | - | 833 | 208 |
| Faridpur | 8,435 | 1,405 | 8,224 | 1,768 |
| Rajshahi | 15,097 | 3,846 | 17,294 | 4,428 |
| Dinajpur | 2,980 | 693 | 1,287 | 341 |
| Rangpur | 4,599 | 1,392 | 127 | 34 |
| Bogra | 541 | 158 | 208 | 57 |
| Pabna | 13,752 | 4,262 | 6,292 | 1,980 |
| Jessore | 1,187 | 238 | 3,625 | 728 |
| Kushtia | 2,114 | 497 | 3,689 | 971 |
| Khulna | - | - | 50 | 8 |
| Total: | 56,805 | 14,471 | 44,257 | 11,449 |

Source: B.B. S., Op. Cit.

Map 10.4



MAIZE (Bhut-ta)

Maize (*Zea mays*) is a minor cereal crop. Unlike Barley, maize production is gaining slightly. In the Chittagong Hill Tracts, Bhoja, Makai and Binnie are the three main varieties grown in the Jhums: They are harvested in August and September. In other parts of Bangladesh, the main maize growing areas are in Daulatpur, Godagari, Shibganj, Nachole, Gomastapur, Porsha, Dhamoirhat, Patnitola, Chorghat, Baraigram, Paba, Chatmohar, Boda, Pirganj, Birganj, Bochaganj, Nawabganj, Ghoraghat and Gobindaganj Upazilas (Map 10.3).

Table 10.8

| Greater District | Maize | | Area | Production |
|------------------|--------------|--------------|--------------|--------------|
| | 1972-80 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 112 | 28 | 313 | 73 |
| Mymensingh * | 4 | 1 | 156 | 18 |
| Chittagong | 83 | 28 | 146 | 53 |
| Hill Tracts | 1,081 | 402 | 6,108 | 2,459 |
| Sylhet * | 24 | 10 | - | - |
| Rajshahi | 2,030 | 770 | 576 | 134 |
| Dinajpur | 1,418 | 382 | 107 | 40 |
| Rangpur | 956 | 336 | 34 | 9 |
| Bogra | 23 | 5 | 16 | 7 |
| Pabna | 93 | 22 | 46 | 12 |
| Khulna | 13 | 3 | - | - |
| Jessore | 77 | 21 | 46 | 38 |
| Kushtia | 90 | 22 | 31 | 12 |
| Total | 6,004 | 2,030 | 7,533 | 2,837 |

Source: B.B. S., *Op. Cit.*

* Four years average

MILLETS

According to the 1983-84 Agriculture Census minor cereals, which include Maize and Millets, was grown on 272,000 acres (225,000 ha). Various millets are grown sparingly both for the grain and for fodder.

Kaun or Italian Millet (*Setaria italica*) and Cheena (*Panicum millaceum*) are the commonest. Kaun is grown both as a Kharif and as a Rabi crop. Cheena is a Rabi Crop. Other millets grown are Marua (*Eleusine Coracana*), Shama (*Panicum colonum*), Kodo (*Paspalum scrobiculatum*), Bajra (*Pennisetum typhoideum*) and Jowar (*Andropogon sorghum*). Marua, Bajra and Jowar are Kharif crops, while Shama and Kodo are Rabi crops. They are mostly grown mixed with maize or sugarcane in small plots near the homesteads. Kaun and Cheena are cultivated as regular field crops in the Char and Diaras of all the larger rivers. Another crop, which may be classed with the millets is Dhemshi (*Polygonia sp.*). This small pinkish plant is grown on sandy soils along the Brahmaputra-Jamuna river and in north Northern Region. It has apparently been introduced recently by immigrants from the Assam Valley.

PULSES, GRAMS, BEANS & PEAS

Seeds of these four types of Leguminous plants are important as articles of food. Soup (Dal) made of pulses is almost as common in the diet of the Bangalis as rice. The Agriculture Census of 1983-84 found 2,139,000 acres (842,000 ha) under Pulse cultivation, whereas the BBS Annual Statistics reported only 600,000 acres. This was revised in the 1989 Statistical Yearbook to 1,985,000 acres (781,000 ha). The tables are, however, based on available BBS District data, and may have to be multiplied by a factor of 3 to reflect the real situation. The following 5 types of pulses are those most commonly grown :

Pulses (Daal)

Masur (*Lens esculenta*) ; *Lentils*

Masur is a low bushy annual, 14-18 inches high. It thrives best on a clay soil, the seed being usually sown broadcast in October-November. The crop is ready for harvesting in about four months. The main areas of production are the northern part of the Southern Region, southern and eastern parts of the Northern Region, western part of the Central Region and some areas on both banks of the upper Meghna (Map 10.5). The pulse beetle, *Calosorbraehus chinensis*, is the major pest for all types of pulses.

Table 10.9

| Greater District | Masur | | Area : in acres Production : in tons. | |
|------------------|-----------------|------------|--|------------|
| | 1972-82 Average | | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 7,235 | 1,939 | 25,145 | 7,790 |
| Mymensingh * | 3,488 | 1,209 | 2,923 | 930 |
| Tangail | 2,114 | 557 | 16,753 | 4,190 |
| Jamalpur * | 3,850 | 1,096 | 4,123 | 1,020 |
| Kishoregonj | 1,892 | 685 | 1,577 | 301 |
| Faridpur | 29,463 | 5,241 | 129,799 | 49,032 |
| Chittagong | 782 | 253 | 925 | 305 |
| Hill Tracts | 124 | 25 | 429 | 107 |
| Noakhali | 1,381 | 263 | 21,908 | 4,032 |
| Comilla | 4,389 | 1,063 | 11,573 | 6,730 |
| Sylhet | 354 | 99 | 1,894 | 480 |
| Rajshahi | 33,208 | 10,213 | 46,567 | 11,385 |
| Dinajpur | 2,157 | 493 | 6,514 | 1,503 |
| Rangpur | 5,586 | 1,714 | 20,404 | 5,636 |
| Bogra | 4,557 | 1,383 | 3,018 | 644 |
| Pabna | 27,991 | 8,417 | 32,561 | 7,779 |
| Khulna | 4,221 | 1,000 | 11,197 | 2,261 |
| Barisal | 6,003 | 1,222 | 17,953 | 5,227 |
| Patuakhali | 858 | 106 | 4,976 | 971 |
| Jessore | 25,482 | 5,347 | 102,712 | 29,483 |
| Kushtia | 17,300 | 4,226 | 71,568 | 18,913 |
| Total : | 182,435 | 46,550 | 534,519 | 158,719 |

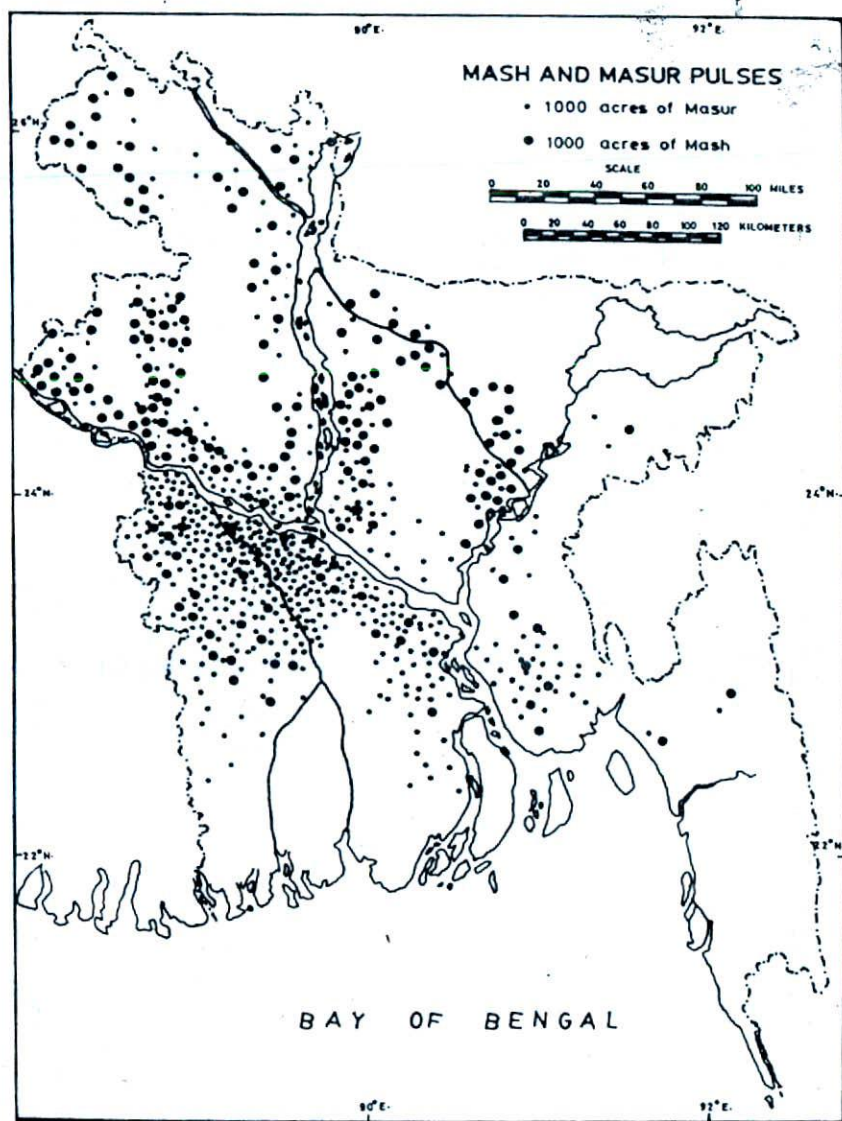
Source: B.B.S., *Op. Cit.*

* Four years average

Khesari (*Lathyrus sativus*)

Khesari is a very popular pulse. It also thrives best on a clay soil being sown broadcast in rice fields in October or November, and harvested in February and March. The main areas of production are the north-eastern part of the Southern Region, the west-central part of the

Map 10.5



Eastern Region, the west, south and east of the Central Region and the south-eastern and north-eastern parts of the Northern Region (Map 10.6). The crop acreage sometimes decreases for dry weather at sowing period.

Moog (*Phaseolus radiatus*), Green Gram, Mung Bean

Moog is another widely grown pulse. It thrives best on a medium loam soil within a PH range of 5.8. to 6.5. Under average conditions, yield of 224 kg (560 lbs) of pulse per acre is obtained. The *Phaseolus radiatus* form is called Hali Moog, the variety *Aurea* is known as Sona Moog, and the variety *Grandis* is Krishna Moog. The early crop is sown in August-September and harvested in November-December. The late crop is sown in December-January and harvested in April-May. The main areas of production are a belt, east of the Meghna river, Bhola island, and a belt of land in the mature Delta of the Southern Region (Map 10.7).

Mash (*Phaseolus mungo*), Black Gram

This pulse is grown best on well-drained heavy loam. It is often grown mixed with linseed, maize or brinjals. It is the chief constituent of the wafers known as Papar. The plant forms very good fodder. There are two varieties of it - the common black and the white-seeded Thakuri. They are sown in August-September and harvested in December-January. The average production per acres is 289 kg. of seeds. The main areas of production are northern and the western part of the Southern Region, southern and eastern parts of the Northern Region, and the western part of Central Region (Map 10.5).

Arhar (*Cajanus indicus*); Pigeon Pea or Red Gram

Arhar is a perennial shrub about 2 to 2.5 metre (six to eight feet) in height. It is sown from April to June, and the first crop from the early varieties is harvested in January-February, while late varieties are harvested in April. It is harvested almost throughout the year, but usually in the rainy season the mature bushes are cut back. The average yield is 330 kg. per acre. Often only small patches of Arhar are cultivated. It is mostly grown in the Northern region and Kushtia district (Map 10.6).

* There is some doubt whether it has been correctly identified. (p. 207)

Map 10.6

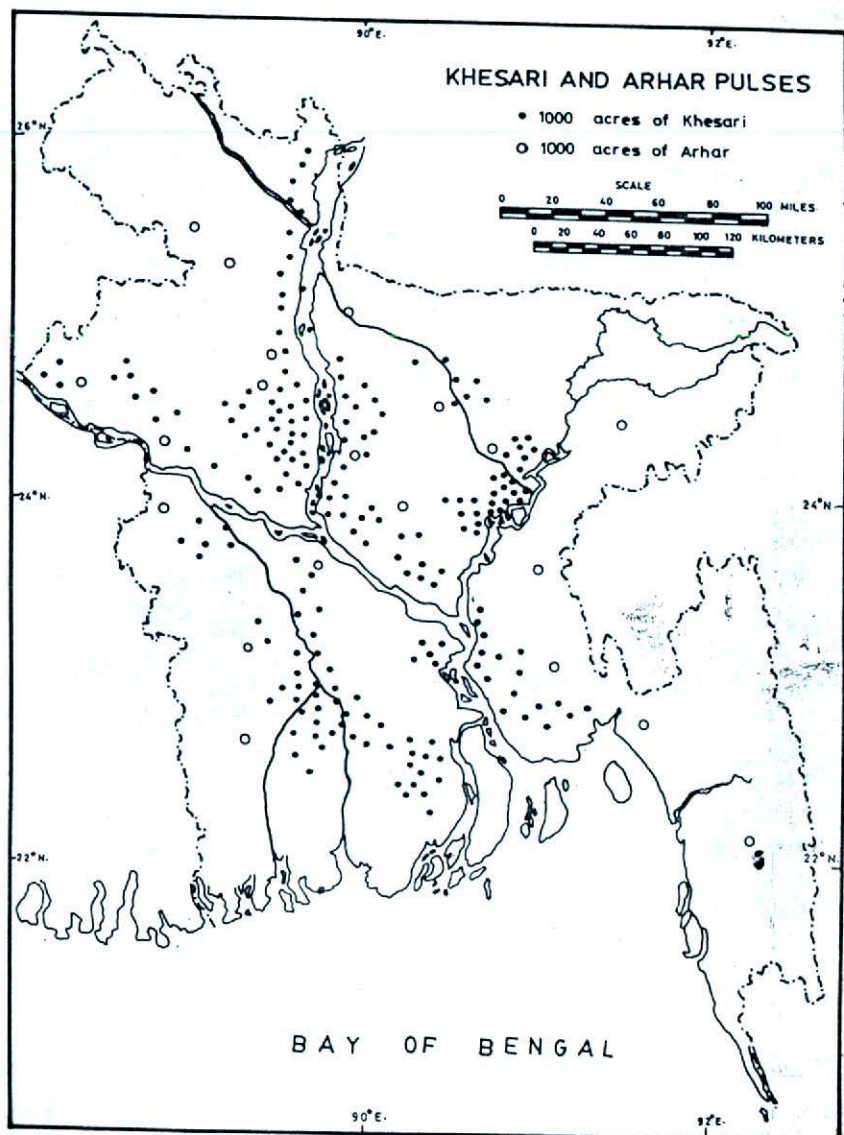


Table 10.10

Moog (Mungbean)

Area : in acres

Production : in tons.

| Greater District | 1972-82 | | 1987-88 | |
|------------------|---------------|--------------|----------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 2,070 | 560 | 2,084 | 685 |
| Mymensingh * | 548 | 189 | 731 | 248 |
| Tangail | 646 | 163 | 351 | 84 |
| Jamalpur * | 948 | 280 | 305 | 86 |
| Kishoregonj | 1,299 | 274 | 812 | 181 |
| Faridpur | 4,946 | 938 | 10,773 | 3,297 |
| Chittagong | 635 | 227 | 2,856 | 936 |
| Hill Tracts | 125 | 26 | 160 | 40 |
| Noakhali | 3,468 | 685 | 18,981 | 4,102 |
| Comilla | 1,241 | 307 | 5,199 | 1,300 |
| Sylhet | 228 | 54 | 78 | 15 |
| Rajshahi | 928 | 261 | 384 | 88 |
| Dinajpur | 1,258 | 320 | 3,913 | 979 |
| Rangpur | 2,580 | 800 | 177 | 51 |
| Bogra | 229 | 68 | 123 | 25 |
| Pabna | 755 | 226 | 264 | 65 |
| Khulna | 482 | 122 | 1,180 | 211 |
| Barisal | 6,059 | 1,549 | 39,104 | 7,138 |
| Patuakhali | 4,935 | 793 | 43,166 | 9,797 |
| Jessore | 2,663 | 565 | 7870 | 2,521 |
| Kushtia | 390 | 87 | 4586 | 1,267 |
| Total: | 36,487 | 8,494 | 143,097 | 33,116 |

Source: B.B.S., *Op. Cit.*

* Four years average

*Gram (Chhola)**Chhola* (*Cicer arietinum*), Chick Pea or Bengal Gram

This is the most widely grown gram in Bangladesh. It is also a Rabi crop like the pulses. It is planted in October-November and harvested in February-March. The seed (gram) is generally of three qualities : brown, yellow and white. Brown gram is the most important type and

comprises a good many shades, e.g., light brown, yellowish-brown, reddish, etc. The main areas of production are the northern and western parts of the Southern Region and the southern and eastern parts of the Northern region (Map 10.7). The Eastern Region grows very little, since it requires a well drained sandy loam soil.

Table 10.11

| Greater District | Mash | | Area : in acres Production : in tons. | |
|------------------|-----------------|---------------|--|---------------|
| | 1972-82 Average | | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 12,933 | 3,551 | 10,124 | 3,091 |
| Mymensingh * | 3,916 | 1,543 | 8,778 | 3,106 |
| Tangail | 8,432 | 2,398 | 17,384 | 5,924 |
| Jamalpur * | 5,994 | 2,053 | 4,884 | 1,712 |
| Kishoregonj | 4,221 | 1,064 | 5,978 | 1,988 |
| Faridpur | 13,912 | 3,140 | 8,650 | 2,696 |
| Chittagong | 1,328 | 559 | 499 | 159 |
| Hill Tracts | 161 | 43 | 340 | 88 |
| Noakhali | 1,225 | 245 | 3,700 | 878 |
| Comilla | 3,656 | 1,026 | 4,437 | 1,234 |
| Sylhet | 517 | 156 | 728 | 174 |
| Rajshahi | 21,036 | 6,565 | 46,120 | 12,757 |
| Dinajpur | 4,493 | 1,399 | 14,868 | 3,802 |
| Rangpur | 9,309 | 2,775 | 8,930 | 3,330 |
| Bogra | 1,910 | 780 | 3,024 | 874 |
| Pabna | 19,350 | 6,263 | 14,226 | 4,349 |
| Khulna | 447 | 112 | 444 | 113 |
| Barisal | 210 | 40 | 658 | 151 |
| Patuakhali | — | — | — | — |
| Jessore | 2,391 | 501 | 11,661 | 3,543 |
| Kushtia | 5,041 | 1,248 | 8,754 | 2,130 |
| Total : | 120,482 | 35,461 | 174,187 | 52,099 |

Source : B.B.S., *Op. Cit.*

* Four years average

Kurti Kalai (*Dolichos biflorus*); Horse Gram

The cultural requirements of this gram are the same as for Chhola. It is grown in small quantities as an intercrop with Chhola, Moog, Brinjal and even Tobacco in the sandier areas of the Northern and the Southern region.

Beans (Shim)Makhon-Shim (*Cavanalia ensiformis*); Sword Bean

This is a robust, woody, perennial, climbing bean bearing large, coarse, rather flat, sword-shaped pods, 25 to 30 cm (10-12 inches) long by about 3.8 cm. (1.5 inches) broad. Both the pods and the beans are eaten. It is the most widely grown of all beans. It is usually, trained on bamboo trellises or over the roofs of the farmers' huts. The closely related Kalo-Shim (*C. virosa*) is also grown with this variety. Other very common beans are Shim (*Dolichos lablab*) and Lima Bean (*Phaseolus lunatus*).

Bakla (*Phaseolus vulgaris*), French Bean

This bean is grown only in the cool season, and is common only near the larger towns. Like most *Phaseolus* beans, it does best on soils with a PH range of 5.8 to 6.5.

Gari-Kalai (*Glycine hispida*) Soya Bean

Soya Bean, so common in China and Japan, is grown in small patches in many parts of the Eastern region, and especially in Noakhali and Chittagong districts. The average yield is near about 454 kg. per acre. The tall growing varieties could be grown for fodder, as they yield 7 to 8 tons per acre.

Shim (*Mucuna nivea*) Velvet Bean

This bean is rather rare in most places, but is an important vegetable for the Char dwellers along the Tista river.

Barbati (Vigna catieng)

This bean, along with Eakla, *Dolichos subcarnosus*, *Dolichos lablab* and *Phaseolus richardiana* are widely cultivated in the Chittagong valleys.

Table 10.12

| Greater District | Arhar | | Area | Production |
|------------------|---------|------------|---------|------------|
| | 1972-80 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 93 | 27 | 133 | 31 |
| Mymensingh* | 100 | 30 | 51 | 15 |
| Tangail | 26 | 7 | 326 | 111 |
| Jamalpur+ | 98 | 29 | 110 | 39 |
| Kishoregonj | 84 | 21 | 26 | 9 |
| Faridpur | 216 | 44 | 331 | 92 |
| Chittagong | 158 | 68 | 83 | 25 |
| Chittagong H.T. | 175 | 44 | 686 | 173 |
| Noakhali | 145 | 33 | 593 | 123 |
| Comilla | 10 | 2 | 961 | 110 |
| Sylhet | 38 | 12 | 17 | 4 |
| Rajshahi | 1,777 | 573 | 1,916 | 442 |
| Dinajpur | 779 | 198 | 430 | 106 |
| Rangpur | 1,069 | 378 | 183 | 47 |
| Bogra | 219 | 67 | 61 | 14 |
| Pabna | 293 | 99 | 312 | 78 |
| Khulna | 61 | 14 | 68 | 16 |
| Barisal | — | — | — | — |
| Patuakhali | — | — | — | — |
| Jessore | 432 | 117 | 1,915 | 545 |
| Kushtia | 2,552 | 688 | 5,523 | 1,877 |
| Total : | 8,325 | 2,451 | 13,742 | 3,857 |

Source : B.B.S., *Op. Cit.*

+ Two years average * Three years average

Kalai (Pisum arvense) Field Pea

Peas of very fair quality are grown in the market gardens around Dhaka and near Chittagong. Generally it is grown without much care and not

even trained onto bamboo stakes or trellises. The yield is, therefore, low. It is treated as a cash-crop and inter-cropped with Kurti-kalai or Mustard (e.g., in Kaunia Upazila). The dwarf varieties are most generally grown. The European Pea (*P. sativum*) is grown mainly in the market gardens near Dhaka and Chittagong.

Chal Kumra (*Benincasa cerifera*), Ash Pumpkins

The Ash pumpkin is an annual vine, grown generally around the farmers' homestead and trained onto the roof (thus the Bengali name 'roof-pumpkin'). It is especially common in parts of northern Rangpur, Kishorganj and Comilla districts.

Kumra (*Cucurbita pepo*), Pumpkin

This vegetable is easily cultivated and gives quick and heavy returns. It is cultivated as a cash crop on the sandy Padma levee of the Southern region and along the old Brahmaputra and Madhumati. The Mishti-Kumra (*C. maxima*) and Safra Kumra (*C. moschata*) are related species which are also widely grown on the sandier soils.

Sosha (*Cucumis sativus*) Cucumber

The Cucumber is a popular winter vegetable, and is widely grown.

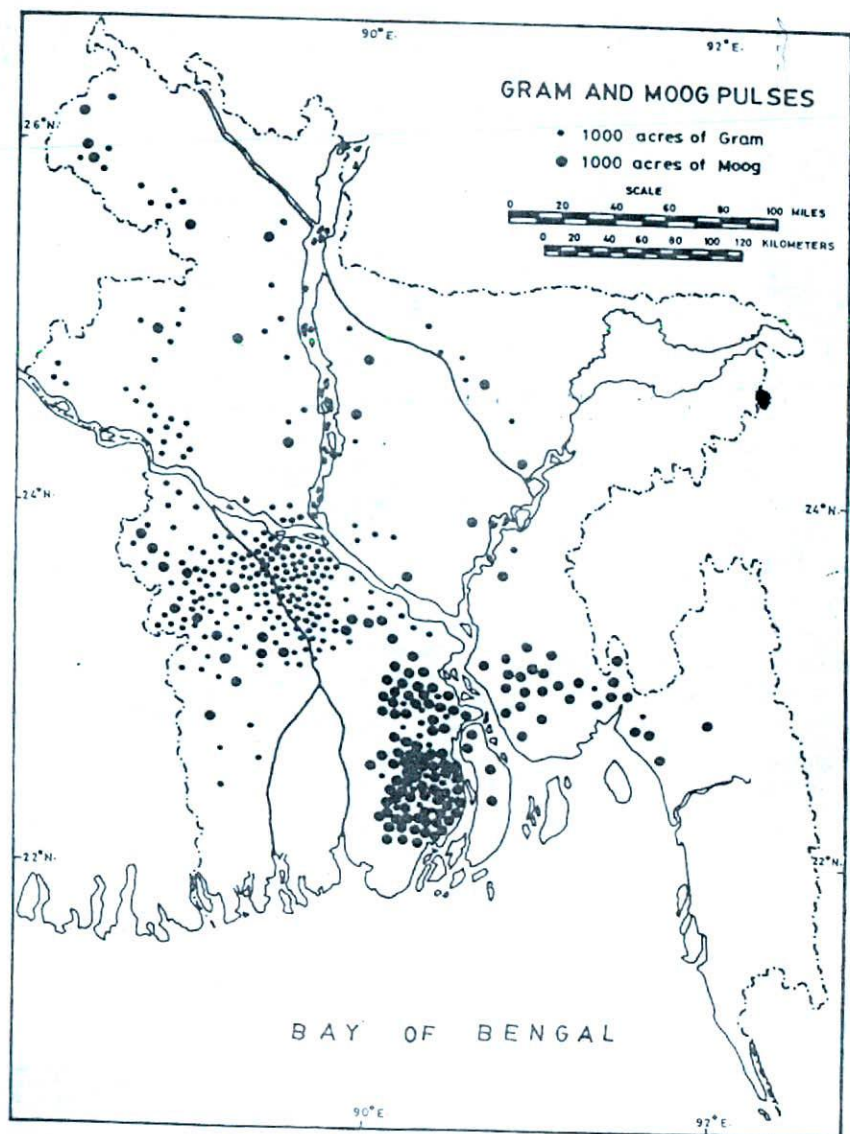
Laau (*Cucurbitaceae*) Gourds, Pumpkins etc.

Melons are left out of this category and described under 'Fruits', since they are generally considered as fruits and not as vegetables. Gourds form a very large proportion of the vegetables grown, and come in many different varieties. The cucurbit fruit fly, *Dacus cucurbitae*, is the major pest for all varieties of *Cucurbitaceae*.

Laau (*Lagenaria vulgaris*) Bottle Gourd

This is the most common, and about the most popular of all vegetables. The fruit varies in length from 41 to 61 cm, and usually resembles a decanter. The vine is trained onto bamboo trellises or small trees

Map 10.7



such as Madar and Badi. It grows best on well-drained sandy loams, and as such bears best in the northern parts of the Northern and the Central regions. There is no area of concentrated production, for in most homesteads, a vine or two are grown. The only area where it is grown mainly for marketing is between Tongi and Pubail, north-east of Dhaka city.

Table 10.13

Gram

Area : in acres

Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 | Production |
|------------------|-----------------|------------|---------|------------|
| | Area | Production | Area | Production |
| Dhaka | 3,679 | 1,022 | 4,138 | 1,538 |
| Mymensingh* | 861 | 227 | 3,945 | 1,393 |
| Tangail | 2,177 | 614 | 1,130 | 365 |
| Jamalpur* | 1,406 | 394 | 1,222 | 381 |
| Kishoregonj | 314 | 92 | 1,498 | 368 |
| Faridpur | 25,162 | 6,924 | 76,965 | 25,741 |
| Chittagong | 184 | 67 | 260 | 99 |
| Hill Tracts* | 7 | 1 | — | — |
| Noakhali | 390 | 92 | 512 | 117 |
| Comilla | 446 | 94 | 195 | 55 |
| Sylhet | 269 | 75 | 5 | 2 |
| Rajshahi | 19,481 | 5,789 | 22,596 | 6,031 |
| Dinajpur | 2,474 | 607 | 8,932 | 2,751 |
| Rangpur | 2,594 | 804 | 2,021 | 602 |
| Bogra | 2,633 | 812 | 2,772 | 725 |
| Pabna | 14,113 | 5,018 | 8,497 | 2,290 |
| Khulna | 1,110 | 320 | 4,455 | 1,472 |
| Barisal | 2,612 | 786 | 9,183 | 2,396 |
| Patuakhali | 828 | 183 | 7,143 | 1,688 |
| Jessore | 26,544 | 6,772 | 78,463 | 20,648 |
| Kushtia | 31,366 | 8,762 | 20,700 | 5,888 |
| Total : | 138,650 | 39,455 | 254,632 | 74,568 |

Source: B.B.S., *Op. Cit.*

* Four years average

Dhundul (*Luffa aegyptica*) *Sponge Gourd*

The Dhundul Gourd is not very common, but widely grown. A vine or two of Dhundul is common in all villages, except those in very low lying areas. The closely related, Jhinga (*L. acutangula*), is somewhat more widely grown.

Korola (*Momordica charantia*) *Bitter Gourd*

The Korola, though bitter in taste, is nevertheless a common vegetable during the rainy season. It is generally 15 to 20 cm. long. A superior variety, 30 to 36 cm. long, is grown in Munshiganj. The Kakrol (*M. cochino-hinesis*) is a related, but not bitter, species which is grown mainly in the Central and Southern regions.

Potol (*Trichosanthes dioica*) *Palwal*

The Potol is a much esteemed summer vegetable. It is planted in September and October, and the ground is covered with straw and water-weeds on which the vines are allowed to trail. The harvest stretches from March to September. It grows best in central Comilla district, eastern Bogra district (main area of production) and along the Madhumati and Ichhamati rivers in Jessore and Khulna districts. Two other related vegetables, the Chichinga (*Trichosanthes anguina*) and Ban Chichinga (*T.cucumerina*) are also cultivated.

TUBEROUS VEGETABLES

Because of their high yield, the tuberous vegetables are becoming increasingly important. Many areas where a few years ago tuberous vegetables were regarded as poor food, they are now grown regularly as a field crop. Indications are that, as the density of populations goes over 463 persons per sq.km (1,200 persons per sq. mile), the cultivation of tuberous vegetables assumes great importance, since only these heavy yielding crops can cover up the deficit in rice and other food-stuffs. This holds good except where market gardening is an important feature of the economy.

Kochu (Aroidae) Taro

Kochu, known as Dasheen in the West Indies and Taro in the Pacific Isles, is the most important of the tuberous vegetables. There are four main varieties: Ol Kohu (*Amorphophallus campanulatus*), Man (*Alocasia indica*), Deshi (*Colocasia antiquorum*), and Pani (*C. nymphaeifolia*). The Narikel variety (*Amorphophallus bulbifer*) is cultivated for its edible leaf-stalks. They thrive in moist and well-manured soil, preferring low-lying ground, near swamps and streams, and yield edible tubers 3 to 9 months after planting depending on the variety. In most homestead, there are a few Kochu, near about the huts, but their cultivation, as a field crop, is rapidly gaining ground as population pressure increase. At present, they are an important field crop in Patiya (in Chittagong), Noakhali, Chandpur, Kishoreganj, Mymensingh North, Barisal, Pirojpur, Bagerhat, Khulna and Jessore districts. Kochu is exported from Bakerganj district to the Central region. The production per acre varies from 3 to 5 tons.

Shak - Alu (*Pachyrhizus angulatus*)

This is another tuberous vegetable rapidly gaining in popularity. It does best in deep loamy soil; it is more adapted to sandier soils than the various Kochus. It is usually planted in June-July and harvested in January-February. The production per acre is often as much as 3 tons. The main areas of its cultivation are east Northern Region and the northern part of the Southern Region.

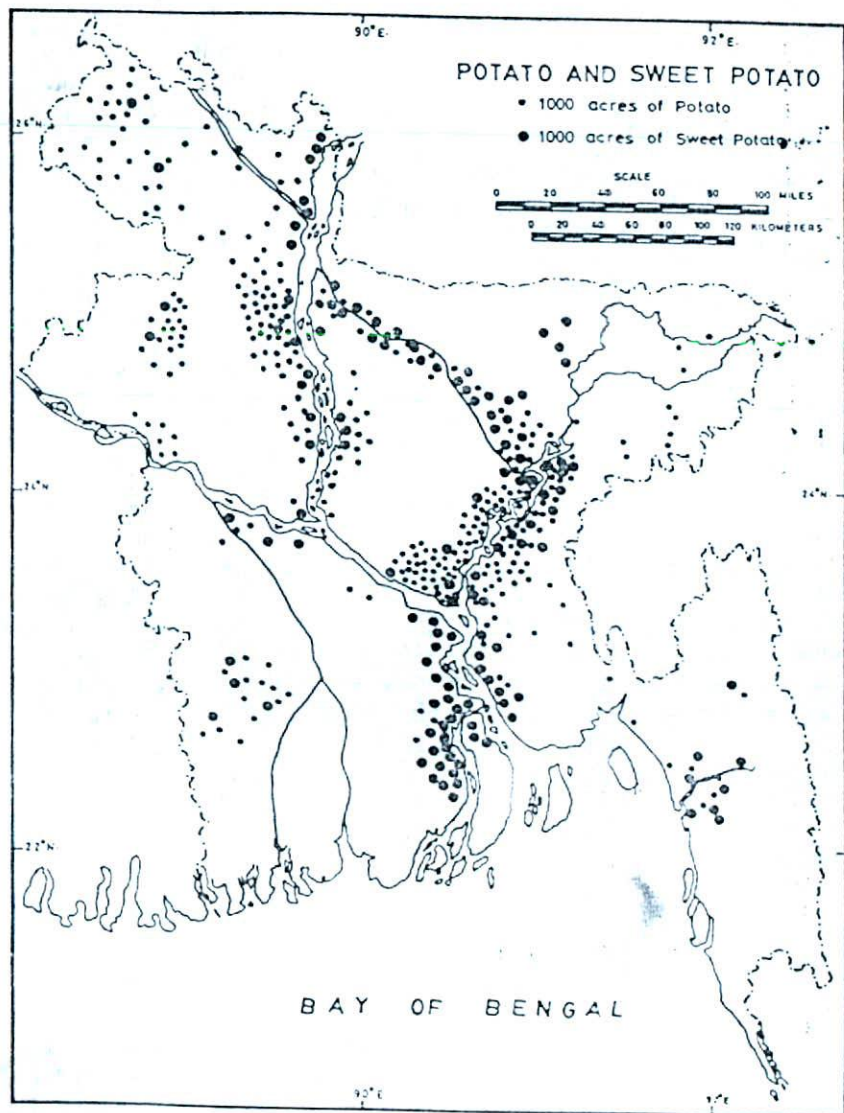
Mishti - Alu (*Ipomoea batatas*) Sweet Potato

This crop prefers a rather dry and good soil of a light texture. It is a common vegetable, especially in those low-lying areas where the levees alone can grow a Rabi crop. The yield per acre is about 3 tons. The main areas of production is a tract of land on either side of the Surma and Meghna; it is largely grown on the levees of low-lying areas, where its large yield and suitability to sandy soils are much appreciated (Map 10.8).

Alu (*Solanum tuberosum*) Potato

Potato is the most important of the tuberous vegetables, but its widespread cultivation dates only from the 1930s. It is sown in October and November and harvested from January to March. The yield varies from 2.5 to 5 tons per acre. In the 1985-90 period, production averaged

Map 10.8



1,100,000 tons per year. The average yield of nearly 3.9 tons per acre the best yield for any food crop that is so largely grown. The yield varies from 2.5 tons per acre, where there is too much clay in the soil (e.g., Begumganj Upazila), to 5 tons in areas where there is a friable moist loam, a gently sloping ground with good natural drainage and a moderately dry climate (e.g., Bogra Upazila). The main areas of production are the eastern and northern parts of the Northern Region (Map* 10.8). The varieties grown fall into two main groups - mealy and waxy. Of the former group, the main varieties are *Shada*, with a whitish skin and flesh. The waxy ones are better eating and fetch better prices.

Table 10.1
Sweet Potato

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 11,470 | 57,714 | 7,610 | 38,995 |
| Mymensingh* | 7,164 | 40,824 | 5,810 | 33,250 |
| Tangail | 8,083 | 26,865 | 3,480 | 13,815 |
| Jamalpur* | 12,333 | 70,445 | 11,095 | 65,980 |
| Kishoregonj | 12,768 | 53,779 | 6,005 | 27,875 |
| Faridpur | 8,309 | 33,342 | 8,175 | 36,580 |
| Chittagong | 5,761 | 30,899 | 6,445 | 34,815 |
| Hill Tracts | 2,303 | 9,454 | 1,580 | 6,285 |
| Noakhali | 13,199 | 52,858 | 7,985 | 34,310 |
| Comilla | 27,788 | 108,386 | 16,125 | 79,620 |
| Sylhet | 5,660 | 36,264 | 3,525 | 14,220 |
| Rajshahi | 3,995 | 14,622 | 2,785 | 9,940 |
| Dinajpur | 2,999 | 10,717 | 1,920 | 5,450 |
| Rangpur | 7,786 | 34,326 | 6,505 | 21,460 |
| Bogra | 4,472 | 13,335 | 3,400 | 12,055 |
| Pabna | 6,945 | 29,758 | 4,950 | 17,820 |
| Khulna | 1,855 | 8,450 | 1,660 | 8,925 |
| Barisal | 17,234 | 72,891 | 12,800 | 50,980 |
| Pattakhali | 7,147 | 19,159 | 11,210 | 34,305 |
| Jessore | 1,311 | 4,237 | 1,835 | 7,115 |
| Kushtia | 1,126 | 3,402 | 1,220 | 3,750 |
| Total : | 169,708 | 731,727 | 126,120 | 557,545 |

Source: B.B.S., *Op. Cit.*

* Four years average

The important varieties are Shilbilati, an elongated tuber with reddish skin, the most popular of all varieties; Goma-bilati, round and reddish; Bilati, round, small; Binnathupti, the size of marbles; Tatnai, large and white; Burma, which is actually an Irish variety; patronege Mualta and dramond varieties from Holland. One of the major drawbacks to potato cultivation is the number of serious diseases to which it is susceptible under the warm climatic conditions. The most common among them are Late Blight (*Phytophthora infestations*), Common Blight (*Althenaria solani*), Tuber Rot (*Fusarium oxysporum*), West Rot (*Physiological breakdown*), Black Spot (*Rhizoctonia* sp.) and Mosaic diseases caused by viruses. It has been found that cold storages are absolutely essential for preserving seed potatoes from one season to another. The establishment of cold storatges has led to an increase in potato cultivation in the Munshiganj and Comilla areas.

Shimul-Alu (*Cassava aipi*) Sweet Cassava.

This is grown in the Eastern region. The bulbous roots are eaten cooked. The making of Cassava flour is not known.

Mula (*Raphanus sativus*) Radish

Radishes grow best in moist and partially shaded situations. They are grown either for home consumption in small plots near the homestead, or in the market gardens, near the larger towns. Both the outer leaves and the roots are eaten as vegetables. It grows best in Sylhet, Jamalpur, Kishorganj, and Chittagong North and South districts. Very large radishes are grown in the Hill Tracts, but their centre is hollow and taste rather insipid.

Gajar (*Daucus carota*) Carrot

Carrots grow best in deep, rich, sandy soils and are thus grown mainly in the market gardens near the larger rivers. It is not popular in the countryside, but is one of the most sought after winter vegetables in the towns. It is extensively grown in the market gardens at the eastern edge of Dhaka city and north of Chittagong city. The carrots of the Kumira areas are noticeably large.

Shalgam (*Beta vulgaris*) Beet

Next to the potato, beet is considered the most nutritious of food crops, but is far from being a popular vegetable. It is grown in limited quantities in the market gardens of Dhaka, Chittagong and Khulna by gardening enthusiasts.

Table 10.14B

| Greater District | Potato | | Area : in acres Production : in tons. | |
|------------------|------------|------------|--|--------------|
| | 1972-82 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 43 | 255 | 61 | 349 |
| Mymensingh* | 9 | 20 | 8 | 21 |
| Tangail | 5 | 12 | 12 | 38 |
| Jamalpur* | 4 | 12 | 6 | 22 |
| Kishoregonj | 10 | 27 | 12 | 37 |
| Faridpur | 2 | 5 | 2 | 8 |
| Chittagong | 7 | 38 | 7 | 33 |
| Hill Tracts | 1 | 4 | 1 | 6 |
| Noakhali | 2 | 8 | 3 | 11 |
| Comilla | 27 | 109 | 45 | 252 |
| Sylhet | 11 | 58 | 10 | 39 |
| Rajshahi | 21 | 52 | 26 | 76 |
| Dinajpur | 19 | 51 | 27 | 90 |
| Rangpur | 23 | 81 | 28 | 83 |
| Bogra | 24 | 63 | 27 | 86 |
| Pabna | 5 | 13 | 8 | 25 |
| Khulna | 6 | 20 | 7 | 42 |
| Barisal | 3 | 10 | 3 | 12 |
| Patuakhali | — | — | — | — |
| Jessore | 3 | 12 | 6 | 33 |
| Kushtia | 2 | 6 | 3 | 10 |
| Total : | 227 | 856 | 302 | 1,273 |

Source : B.B.S., *Op. Cit.*

* Four years average

Piaz (Allium cepa) Onion

Onion is widely grown, for it is an indispensable item in the culinary preparations of the Bengali. It is eaten either raw, or cooked in curries. Since it prefers a light soil, it is grown on a large scale on the sandier river levees. It is sown from October to December and harvested from January to March. The average yield is about 1.7 tons per acre. In 1988-89

Table 10.15

Onion

Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|----------------|--------------------|----------------|
| | Area | Production | Area | Production |
| Dhaka | 6,454 | 11,040 | 6,235 | 12,380 |
| Mymensingh* | 2,358 | 4,399 | 2,355 | 3,815 |
| Tangail | 2,370 | 2,602 | 2,805 | 2,720 |
| Jamalpur* | 3,358 | 5,671 | 3,375 | 6,880 |
| Kishoregonj | 1,874 | 2,812 | 1,825 | 2,515 |
| Faridpur | 14,467 | 20,448 | 17,450 | 31,010 |
| Chittagong | 841 | 1,642 | 855 | 1,490 |
| Hill Tracts | 234 | 342 | 320 | 425 |
| Noakhali | 760 | 776 | 1,035 | 1,360 |
| Comilla | 4,688 | 8,636 | 2,985 | 5,130 |
| Sylhet | 664 | 1,485 | 590 | 730 |
| Rajshahi | 6,822 | 10,688 | 6,640 | 12,040 |
| Dinajpur | 4,971 | 8,072 | 5,495 | 8,245 |
| Rangpur | 6,692 | 14,165 | 4,475 | 8,295 |
| Bogra | 4,596 | 5,347 | 4,845 | 4,920 |
| Pabna | 6,466 | 13,747 | 8,040 | 12,650 |
| Khulna | 1,643 | 4,184 | 2,065 | 3,540 |
| Barisal | 2,001 | 2,288 | 1,600 | 1,725 |
| Patuakhali | 352 | 339 | 500 | 420 |
| Jessore | 4,034 | 8,860 | 6,630 | 13,260 |
| Kushtia | 3,006 | 5,940 | 3,695 | 7,015 |
| Total : | 78,651 | 133,483 | 83,815 | 140,545 |

Source: B.B.S., *Op. Cit.*

* Four years average

production was 136,000 tons. The main area of production is along the right bank of the Padma river (Goalundo, Pangsha, Faridpur, Sadarpur, Shibchar, Janjira and Naria Upazilas). Secondary areas of commercial importance are a central tract in the Northern Region (Pirgachha, Gobindaganj, Palashbari, Shibganj, Bogra, Khetlal, Adamdighi and Bagmara Upazilas) and a tract in Southern Central Region (Keraniganj, Singair, Harirampur and Raipura Upazilas) (Map 10.10).

Roshun (*Allium sativum*), Garlic

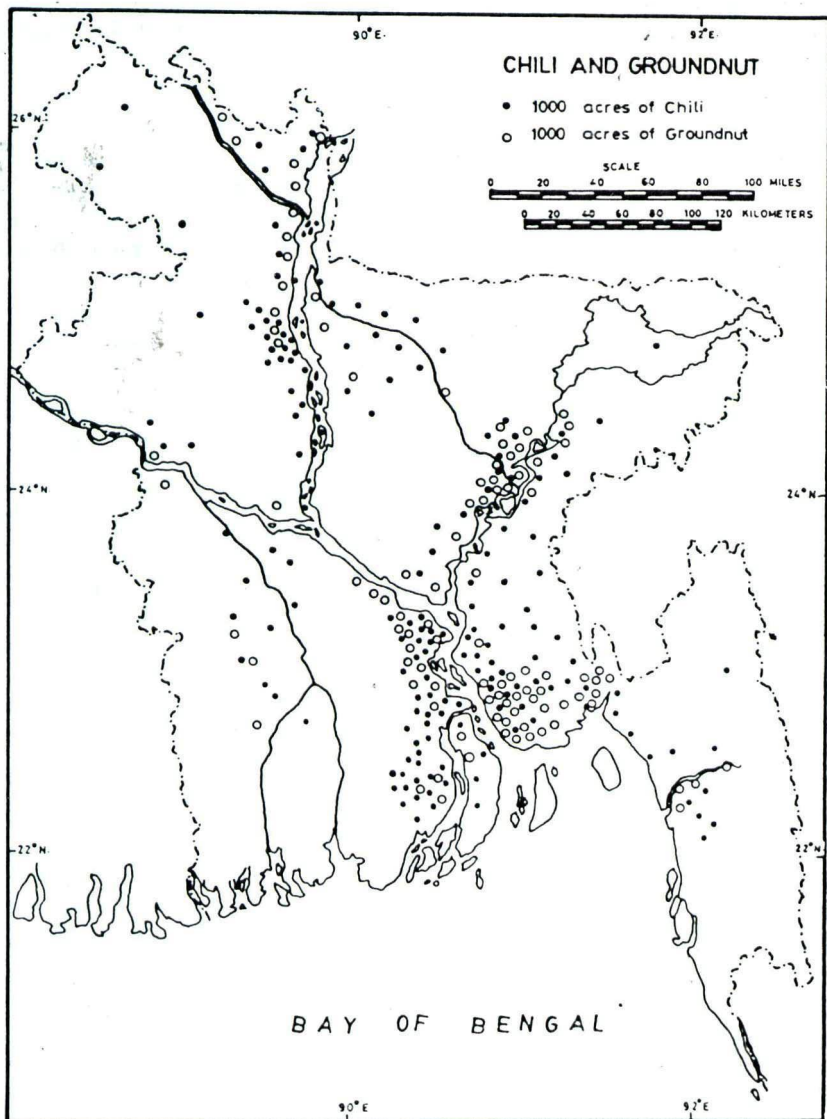
Garlic powder is one of the five main ingredients used to make curries. It has a wider optimum soil range than onion. The production of garlic has averaged 38,000 tons per year in the period 1984-89. The main areas of increase are in Faridpur and Rangpur districts. Garlic is also planted in October-November, but is harvested mainly in February and March. The main areas of production are more or less the same as that of onion (Map 10.10).

OTHER VEGETABLES

Begun (*Solanum melongena*) Brinjal

Brinjal (*Anbergine*) is the most important of all the vegetables grown, both because of the volume of its production and also because of its popularity. The brinjal plant is a low, bushy, annual bearing, large smooth fruits, usually of a purple colour. There are, however, numerous varieties, differing chiefly in the shape, size and colour of fruit, which may be round, oval or cucumber-shaped, and white, grey or purple in colour. The Gole-Begun of Gaffargaon is round in shape, 23 cm. or more in diameter, and usually deep purple. The Anda variety is small, round and white. The Tal variety is long and cylindrical, a light purple streaked with white. This is the most common type. The Kuli-Begun belongs to a different botanical variety (*S.melongena var-esculenta*). It is thin and long and grown in bunches. Begun is sown in nurseries in January-February and transplanted to the fields from April to June. It is harvested mainly from October to December. Kuli-Begun is sown in nurseries in September-October, transplanted a month later and harvested from February to June. On an average, the yield per acre from either type is 3 tons. The brinjal fruit and shoot borer, *Leucinodes orbonalis*, is the

Map 10.9



major pest of this vegetable. The main area of production is a belt along the eastern edge of the Madhupur Tract (Mymensingh to Dhaka) and the lower eastern parts of the tract itself. It is also a prominent vegetable in south-east Rajshahi, north Rangpur, north Khulna, south Jessore, east and south Comilla district. The average annual area under brinjal is 66,000 acres (2,6,000 ha) and average production is 165,000 tons.

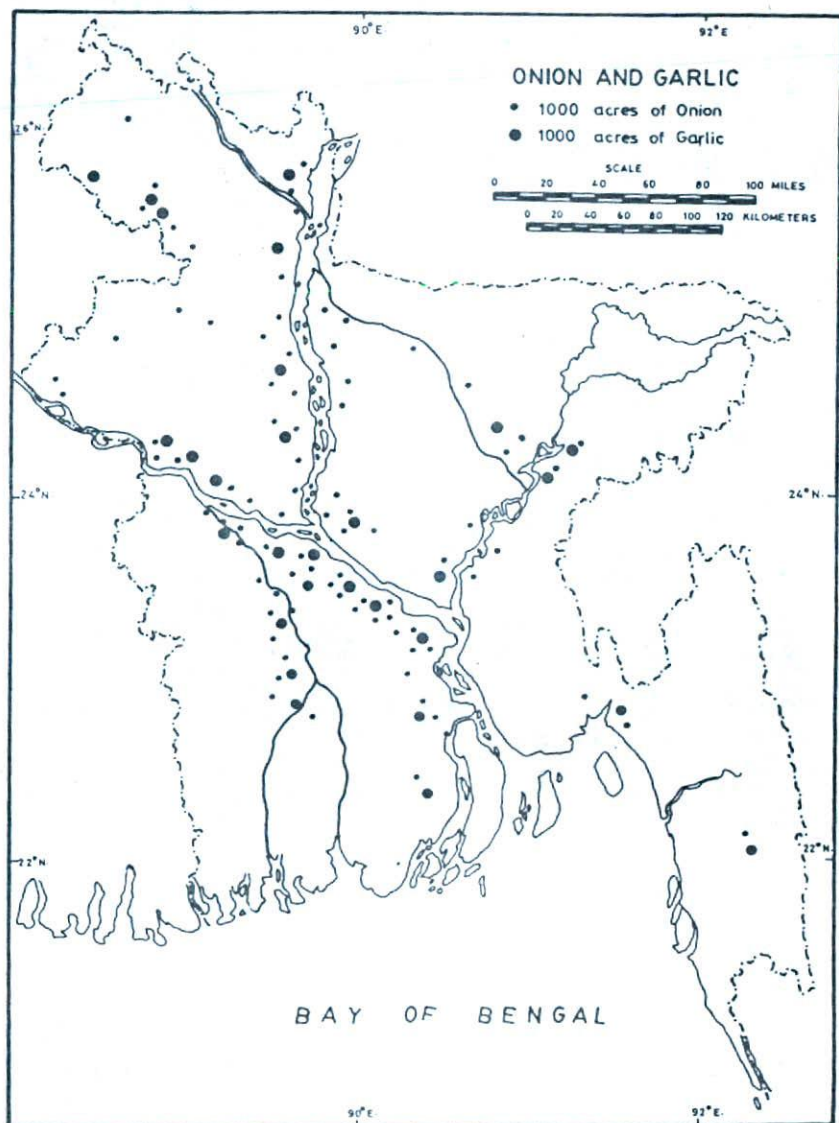
Table 10.16

| Greater District | Garlic | | | |
|------------------|-----------------|---------------|---------------|---------------|
| | 1972-82 Average | | 1987-88 | |
| | Area | Production | Area | Production |
| Dhaka | 1,870 | 2,455 | 2,095 | 2,875 |
| Mymensingh* | 814 | 1,311 | 860 | 920 |
| Tangail | 820 | 859 | 685 | 520 |
| Jamalpur* | 1,186 | 1,751 | 1,295 | 1,870 |
| Kishoregonj | 1,579 | 1,781 | 1,030 | 990 |
| Faridpur | 6,659 | 7,151 | 6,425 | 8,770 |
| Chittagong | 520 | 850 | 505 | 650 |
| Hill Tracts | 194 | 249 | 210 | 300 |
| Noakhali | 842 | 846 | 1,040 | 1,125 |
| Comilla | 1,993 | 2,483 | 1,330 | 2,230 |
| Sylhet | 294 | 512 | 365 | 285 |
| Rajshahi | 1,365 | 1,736 | 2,120 | 3,035 |
| Dinajpur | 2,427 | 3,169 | 3,185 | 2,250 |
| Rangpur | 2,739 | 4,345 | 1,975 | 2,270 |
| Bogra | 674 | 763 | 660 | 690 |
| Pabna | 1,663 | 2,377 | 2,055 | 2,610 |
| Khulna | 480 | 861 | 780 | 985 |
| Barisal | 1,895 | 2,158 | 1,360 | 1,480 |
| Patuakhali | 283 | 230 | 455 | 375 |
| Jessore | 1,384 | 1,920 | 2,320 | 2,895 |
| Kushtia | 1,253 | 2,116 | 1,270 | 1,990 |
| Total : | 30,934 | 39,923 | 30,920 | 38,815 |

Source: B.B.S., *Op. Cit.*

* Four years average

MAP 10.10



Tomato (*Lycopersicum esculentum*) Tomato

In the market gardens near the large towns, the tomato is the winter replacement for brinjals. In the Eastern and Central Regions, it is widely grown. It is sown in October-November and harvested from January to March. The plants are, unfortunately, allowed to trail and thus much fruit is spoilt.

Dherosh (*Hibiscus esculentus*) Okra

Okra (Lady's finger) is a favourite summer vegetable. It does not require much tending, which may be one of the reasons for its popularity.

Bandha-Kopi (*Brassica oleracea* var.) Cabbage

Of all the European vegetables introduced to the areas now in Bangladesh, the cabbage and the cauliflower are the most popular. Cabbages are now grown in almost every village. Its cultivation having spread even to remote parts of the Northern Region through the agency of Mymensingh settlers. Excellent specimens have been grown in many places (e.g., Chandpur, Thakurgaon, Khulna) sometimes weighing upto 9 kg. In the market gardening area, on the eastern edge of Dhaka city, cabbages occupy 60% of the vegetable land.

Phul-Kopi (*Brassica oleracea botrytis*) Cauliflower

The cultural requirements and the areas of production are the same as for cabbages. In the winter months the cauliflower is a strong contender with the tomato for being the most popular vegetable. In the farmers' backyard gardens the heads are generally small, but in some market gardens large specimens are regularly grown.

Ol-Kopi (*Brassica caulorapa*) Kohl-Rabi

Kohl-Rabi is sparingly grown in many parts of Bangladesh. This vegetable, too, is mainly grown in market gardens.

Bokful (*Sesbania grandiflora*)

The flower of this small tree are eaten in curries. It is fairly common in the North, Central and West-Southern Regions.

Salad-Pata (*Lactuca sativa*) Lettuce

Lettuce does not grow very well, for often they run quickly to seed. In all, a couple of acres are, however, grown in the market gardens very near the urban areas of Dhaka and Chittagong.

Shajna (*Moringa oleifera*)

The long pods of this tree are a favourite vegetable, but it is in season for a short time.

Pahari Rai (*Brassica rugosa*, Variety *Cuneifolia*)

The leaves of this variety of 'Mustard' are used as vegetable.

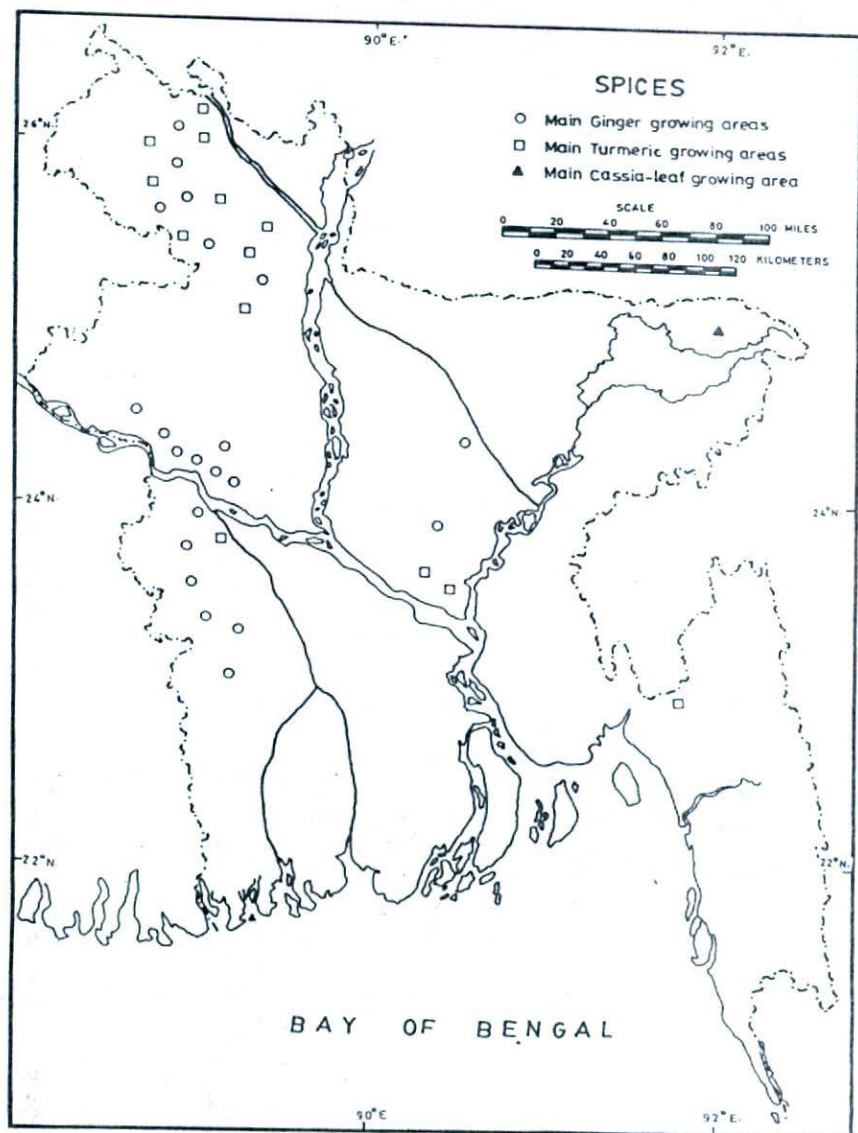
SPICES, CONDIMENTS & SEASONING HERBS

Chilli (*Capsicum spp.*) *Morich*

Chillies are an indispensable flavouring ingredient in the Bangladeshi cuisine. Sun-dried and powdered, they are used to flavour curries, also eaten in the green state, or fried in oil or put into pickles. There are three types of chillies: Capsicum (*Capsicum annuum*), Cayenne (*C. frutescens*) and Bulls Eye (*C. minimum*). Capsicum is sparingly grown in the plains, since it is not very pungent. In the Hill Tracts, especially the Chhipui Tlang Range, very large ones are grown. Cayenne of two types are grown. Those meant to be eaten green and those to be dried and powdered. The former type, Bhadoi chillies, including such varieties as Shurjamukhi, ripen mainly in summer, from the beginning of March to the middle of June. The other type, Rabi chillies, ripens from September to April. For them, seed beds are prepared in January, in which the seeds are sown in July. The fields in which they will be grown are ploughed six to eight times and often manured with as much as five tons of cow-dung per acre. The seedlings are transplanted in August and they bear from September to April. The chilli pods turn a beautiful orange-red when ripe. The yield per acre is 2.5 tons of fresh chilli, which when dried weigh 454 kg (1,000 lbs). Almost everywhere chilli - rice rotation is practised.

The third type, Bull's Eye (Dhoney/Dhainna), is tiny in size but extremely pungent. It is grown mainly in Noakhali and Chittagong, where chilli consumption is the highest in Bangladesh. Chilli is most productive in soils with a high proportion of silt. The main chilli belt is a fertile area (Map 10.9), which stretches from Nabinagar to Lalmohan.

Map 10.11



The average area under chilli is 194,000 acres (76,000 ha) and the production is 46,000 tons, in terms of dried chillies. It is a crop of considerable importance, since in the very heavily populated areas of Comilla and Noakhali, it ranks with jute and betelnut as one of major cash crops. In fact in the area south of a line drawn from Noakhali to Comilla and north of Mirsarai it is the main cash crop. It is also the main cash crop in Kaliganj of Lalmonirhat district and Keshabpur Upazilas in Jessore.

Table 10.17

Chili

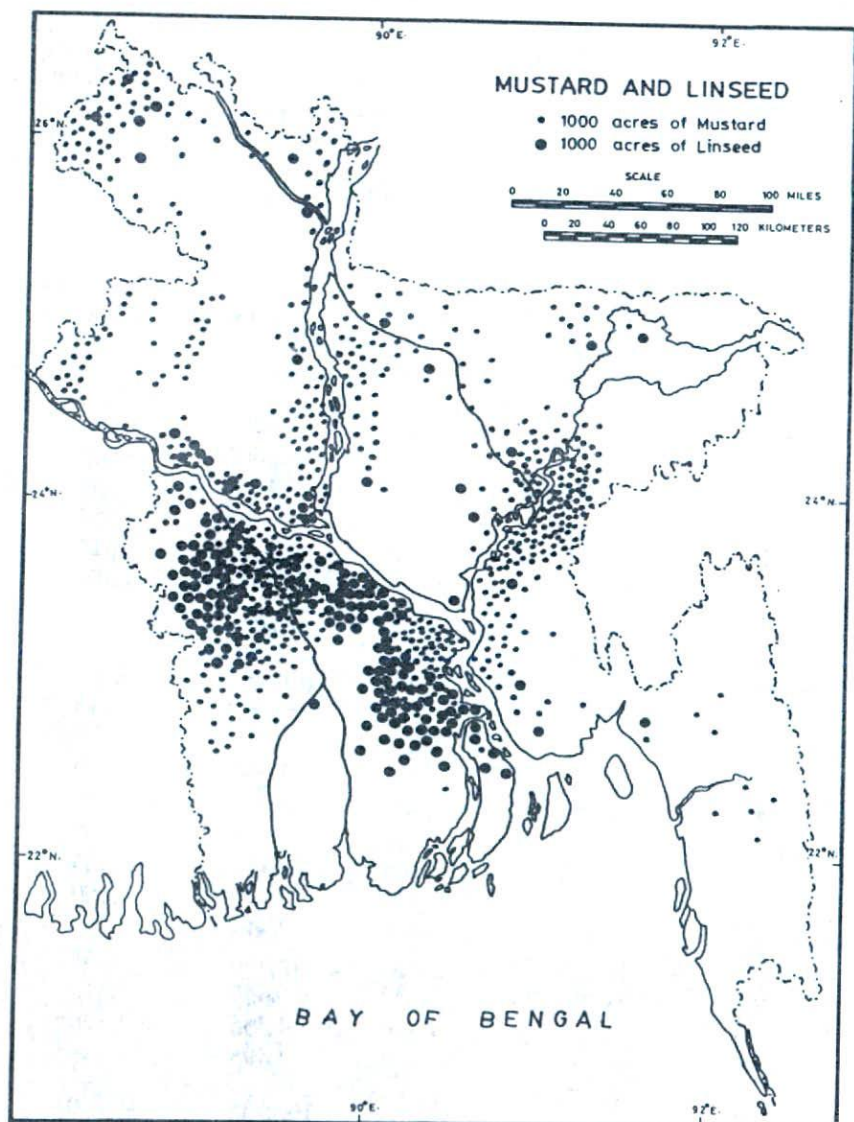
Area : in acres
Production : in tons.

| Greater District | 1972-82 | | 1987-88 | |
|------------------|----------------|---------------|----------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 6,349 | 1,263 | 5,020 | 1,310 |
| Mymensingh* | 5,023 | 1,310 | 4,660 | 1,530 |
| Tangail | 3,032 | 791 | 2,135 | 535 |
| Jamalpur* | 3,901 | 892 | 6,015 | 1,955 |
| Kishoregonj | 8,423 | 1,922 | 5,720 | 1,615 |
| Faridpur | 14,516 | 3,111 | 15,480 | 4,365 |
| Chittagong | 13,234 | 4,822 | 10,320 | 3,675 |
| Hill Tracts | 2,119 | 559 | 2,170 | 595 |
| Noakhali | 17,149 | 3,107 | 14,550 | 3,320 |
| Comilla | 27,617 | 6,060 | 21,750 | 5,315 |
| Sylhet | 6,262 | 1,911 | 2,760 | 605 |
| Rajshahi | 4,234 | 1,073 | 3,360 | 910 |
| Dinajpur | 4,521 | 1,050 | 2,660 | 755 |
| Rangpur | 12,772 | 4,262 | 7,465 | 2,305 |
| Bogra | 16,373 | 4,706 | 15,155 | 4,525 |
| Pabna | 4,838 | 1,466 | 5,670 | 1,660 |
| Khulna | 3,218 | 868 | 2,910 | 765 |
| Barisal | 20,323 | 4,484 | 16,430 | 4,355 |
| Patuakhali | 11,658 | 1,682 | 16,450 | 5,310 |
| Jessore | 4,275 | 1,426 | 4,355 | 1,520 |
| Kushtia | 2,041 | 592 | 1,495 | 345 |
| Total : | 191,878 | 47,357 | 166,535 | 45,270 |

Source : B.B.S., *Op. Cit.*

* Four years average

Map 10.12



Tejpata (*Cinnamomum tamala*) Cassia Leaf

Cassia-leaf (Bay leaf) obtained from the Tejpata tree, is used for flavouring curries and rice dishes. Tejpata trees grow semi-wild north of the Tista river. In Gowainghat Upazila, in northern Sylhet district, it is cultivated on 178 acres. (Map 10.11)

Ada. (*Zingiber officinale*) Ginger

The ginger of commerce are the tuberous rhizomes of this herbaceous perennial. The plant requires an equable hot and moist climate, shaded situation and a rich well-tilled humus or loamy soil. The yield varies from 1.5 to 4 tons per acre. It is usually grown mixed with turmeric. The areas of concentrated production are Saidpur, Domar, Nilphamari, Narayanganj, Mirkadam and Savar. Areas of secondary importance: Meherpur, Mirpur, Magura, Mohammadpur, Sripur, Keshabpur, Kotchandpur and Kaliganj Upazilas. It is inter-cropped with bananas in Munshiganj district (Map. 10. 11).

Holdi. (*Curcuma domestica*) Turmeric

Turmeric has more or less the same requirements as ginger and is grown mixed with it in small plots, usually set inside a grove of trees. Yield per acre varies from 0.5 to 0.65 tons of dry turmeric. Half a tons of green turmeric is required as seed per acre. The rhizomes are planted from April to June. In ten months they mature, when the leaves wither away. The plants are then cut away, but the roots are left undisturbed for three weeks, when they are dug up. The areas of production are identical with those of ginger, since the practice is to sow these crops in adjacent plots or even mixed. Nator, Rajshahi, Pabna, Kushtia, Chuadanga, Jessore, Jhenidha, Nilphamari and Gaibandha districts account for two thirds of the production. On the average 34,000 acres (13,000 ha) are under this crop, which yield about 24,000 tons of dry turmeric (Map. 10.11).

Gol Morich (*Piper nigrum*) Pepper

Though very much in demand, pepper cultivation has been successful only in a few villages of northern Sylhet district and Banderban. It's cultivation is being tried out at Cox's Bazar, Nhilla, and Jaintiapur.

Condiments & Seasoning Herbs

A great variety of condiments and seasoning herbs are grown or collected for food. Herbs (Shak) are a great favourite with the Bengalis and no less than forty different varieties are eaten. Among the main condiments and seasoning herbs cultivated or found wild are Aniseed, (Guamour) (*Pimpinella anisum*), Sweet Basil (Tilshi) (*Ocimum basilicum*), Ajwan (*Carum copticum*), Coriander (Dhonia) (*Coriandrum sativum*), Fennel (Jira) (*Foeniculum vulgare*), Fenugreek (Methi) (*Trigonella foenumgraecum*), Spearmint (Pudina) (*Mentha viridis*), Danta Shak (*Amaranthus mangovanus*), (Lal Shak) (*Amaranthus gangeticus*), Nete Shak (*Amaranthus blitum var oleracea*), Kalmi Shak (*Ipomoea reptans*), Sushni Shak (*Marsilea quadrifoliata*), Spinach (Palang Shak) (*Spiacea oleracea*), Pui Shak (*Basella rubra*), etc. Leaves of the young jute plant is a common vegetable in the early summer months.

OIL - SEEDS

Various types of oil-seeds are grown mainly for edible oil. Upto early 1970s the main cooking medium of the Bengalis was mustard oil, but during the last decade soyabean oil has gained popularity as a cooking medium. The demand for it exceeds the local supply. Production of the other oil-seeds is, however, quite sufficient to meet the local demand and even have a surplus for export. As pointed out earlier, the 1983-84 Agriculture Census found the area grown under oilseeds was twice as much as is reported in the annual statistics.

Rai Sorisha - Mustard

The mustard of commerce is often a mixture of mustard, rapeseed and colza in varying proportions. There is some confusion as to proper classification of these oleiferous seeds of the Brassica species. Here the nomenclature given by Z. Alam (1945) has been followed. The form of mustard generally grown is *Brassica juncea*, called li or Lahi in Bengali. Two types of Colza are grown mixed with it, *Brassica trilocularis* and *B. Campestris* subspecies *ampestris variety dichotoma*. The former is yellow seeded called Seti Sarisha and the latter is brown seeded Kalo Sarisha. Rapeseed is known by several names such as Lutni, Sarisha, Maghi, Toria, etc. it is classified as *Brassica campestris sub-species Napus variety toria*.

The yield of oil from these seeds varies from 30% to 38% of their weight. The country-expellers (Ghanis) manage to extract from 30 to 35% oil from the seeds, whereas expeller machines get upto 38 per cent on

the average. The average recovery of oil is about 33.5%. The rest is sold as oilcake, to be used as cattlefeed or manure. The oil is used for culinary purpose, for lighting or for external bodily application. Rapeseed is sown in August and September, and harvested in December and January. Mustard and Colza are sown from September to November and harvested in February and March. Seeds are sown broadcast at the rate of 2.7 to 3.6 kg. (6 to 8 lbs) per acre on well-tilled soil, preferably sandy loam. These oil-seeds are Rabi crops, following Aman or Aus rice, on Danga level fields.

Table 10.18
Rape and Mustard
Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 53,201 | 13,213 | 7,464 | 2,360 |
| Mymensingh* | 10,363 | 2,138 | 13,226 | 3,441 |
| Tangail | 29,842 | 6,341 | 148,809 | 40,327 |
| Jamalpur* | 9,916 | 1,990 | 27,325 | 8,292 |
| Kishoregonj | 20,737 | 5,074 | 27,746 | 7,333 |
| Faridpur | 38,549 | 6,712 | 87,220 | 28,943 |
| Chittagong | 890 | 227 | 2,222 | 591 |
| Hill Tracts | 5,924 | 1,519 | 6,392 | 1,825 |
| Noakhali | 687 | 124 | 7,328 | 2,142 |
| Comilla | 50,584 | 16,116 | 112,552 | 35,711 |
| Sylhet | 13,083 | 3,814 | 19,172 | 5,145 |
| Rajshahi | 47,402 | 10,746 | 46,188 | 11,327 |
| Dinajpur | 50,130 | 10,406 | 44,925 | 10,867 |
| Rangpur | 40,542 | 11,289 | 21,573 | 6,144 |
| Bogra | 10,498 | 2,598 | 9,348 | 2,436 |
| Pabna | 45,024 | 12,827 | 60,489 | 18,605 |
| Khulna | 6,642 | 1,397 | 13,256 | 3,147 |
| Barisal | 3,697 | 818 | 10,945 | 2,361 |
| Patuakhali | 348 | 50 | 1,082 | 179 |
| Jessore | 32,047 | 7,279 | 97,889 | 25,249 |
| Kushtia | 11,531 | 2,347 | 20,320 | 5,583 |
| Total : | 481,637 | 117,025 | 785,471 | 222,008 |

Source: *Op. Cit.*

* Four years average

The main areas of production are a broad belt of land in the north of the Northern Region, from Birganj to Gaibandha, with a southern projection, mainly between Karatoa and Bangali rivers, south to the Ganges levee, and also a broad belt across the north of the Central Region, from Diwanganj to Mohanganj, with an outlier southwards to the upper reaches of the Meghna river (Map 10.12). Only in Chittagong district some European Colza, *Brassica campestris var. oleifera* is grown.

Table 10.19

Linseed

Area : in acres

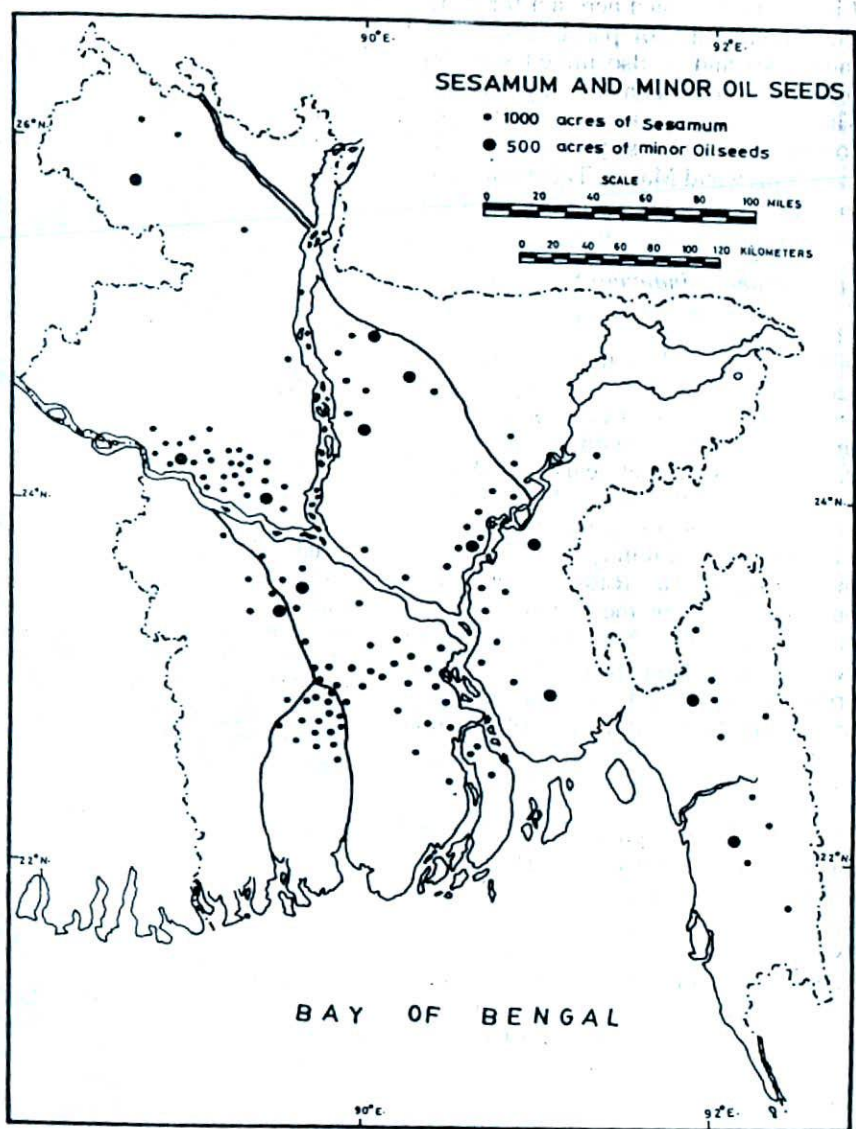
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 | |
|------------------|-----------------|--------------|----------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 171 | 31 | 3,229 | 734 |
| Mymensingh* | 10 | 2 | 186 | 29 |
| Tangail | 389 | 75 | 766 | 188 |
| Jamalpur* | 68 | 14 | 573 | 138 |
| Kishoregonj | 377 | 73 | 922 | 170 |
| Faridpur | 7,462 | 1,204 | 45,360 | 10,345 |
| Chittagong | 29 | 8 | 60 | 20 |
| Hill Tracts | — | — | — | — |
| Noakhali | 559 | 96 | 2,450 | 442 |
| Comilla | 411 | 75 | 1,087 | 289 |
| Sylhet | 1,880 | 398 | 2,140 | 377 |
| Rajshahi | 7,255 | 1,622 | 5,126 | 1,163 |
| Dinajpur | 73 | 15 | 2,409 | 482 |
| Rangpur | 352 | 84 | 1,894 | 501 |
| Bogra | 100 | 17 | 595 | 170 |
| Pabna | 8,852 | 1,871 | 6,157 | 1,650 |
| Khulna | 872 | 155 | 552 | 45 |
| Barisal | 50 | 10 | 47,317 | 11,834 |
| Patuakhali | 20 | 5 | — | — |
| Jessore | 2,128 | 628 | 56,366 | 12,498 |
| Kushtia | 2,881 | 564 | 8,640 | 2,071 |
| Total : | 34,940 | 6,947 | 185,829 | 43,216 |

Source : *Op. Cit.*

* Four years average

Map 10.13



Tishi (*Linum usitassimum*) *Linseed*

Linseed is cultivated here not for its fibre, but for its seeds. Its oil is used in the manufacture of paints and varnishes, linoleum, printers' ink, some medicines and is also mixed with mustard oil to adulterate that cooking medium. The oil content ranges from 38 to 48% and average yield is 34%. There are two main varieties of seeds, small and bold. Linseed is usually sown mixed with sesamum or gram in October and November and harvested in February and March. The main areas of production are along both sides of the Ganges, north of Sylhet and along the lower Meghna (Map 10.12).

Til (*Sesamum indicum*) *Sesamum*

This is an important oilseed, its oil being considered a good substitute for mustard oil. Much of it is, however, consumed in sweetmeats, in the form of seed. It forms the basis of a number of toilet preparations, perfumes and medicines. Sesamum cake is a better fodder than mustard-cake. There are three varieties of seeds : (i) A white small type used mainly in the preparation of sweetmeats, (ii) White, large, and (iii) Black, large types. The black variety has the highest oil-yield. On the average sesamum seeds yield 37.5% of oil in relation to weight. Two crops are raised annually. The Aghani (summer) crop is sown in February-March and harvested in May-June. The Rabi (winter) crop is sown a month or so after the harvesting time of the summer crop (though not on the same fields), and is harvested from November to January. The seeds are sown broadcast, often with rice and the yield per acre is around 195 kg. (430 lbs). The main areas of production are the central and eastern parts of the Southern region and the western part of Comilla district (Map 10.13).

Cheena Badam (*Arachia hypogaea*) *Groundnut*

The cultivation of groundnut has been steadily increasing. In 1944-45 only some 2,500 acres of it were grown. By 1955-56, it was 10,400 acres and by 1959-60 it had gone up to 28,260 acres (11,125 ha). Difficulties of procuring seed, marketing and processing led to a slight set-back in the early 1960s. With the operation of the Groundnut Oil Mill at Bhairab, production picked up again. The average annual production in the period 1987-89 was 44,000 tons. It is grown in most districts, but in scattered patches. In Bajitpur and Bhairab Bazar Upazilas, however, it is grown extensively as a major cash-crop (Map 10.13). Late varieties are grown : the seeds are sown in November-December and harvested from March to May. The yield per acre is about 544 kg. (1,200 lbs) of dried nuts. Groundnut oil can be processed into vegetable Ghee (*Margarine*) for which there is a large demand. Average oil yield is about 40%.

CASTOR (*Ricinus communis*) Behenda

It is not cultivated systematically, but in the Northern region almost every homestead has a few plants. In the Chars and Diaras it is sometimes planted as wind break. At present yield could very easily be raised to meet the small demand.

Table 10.20

Sesamum

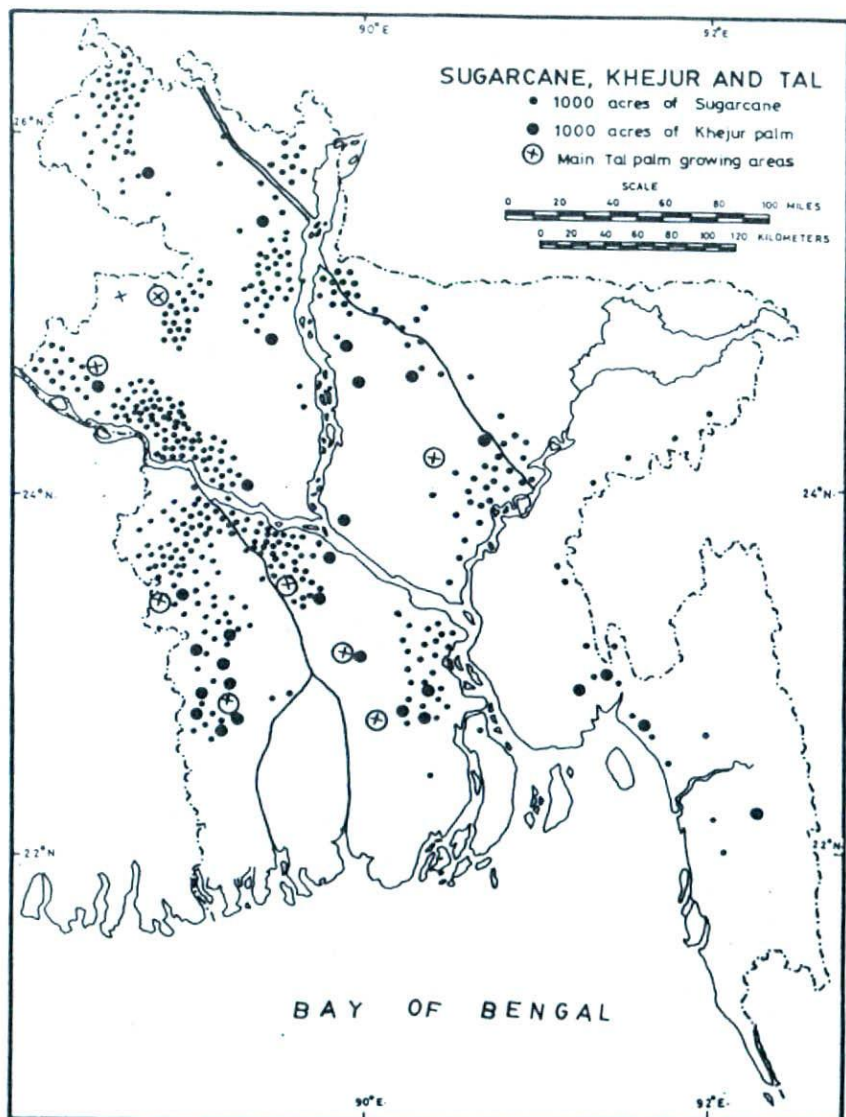
Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | |
|------------------|-----------------|------------|
| | Area | Production |
| Dhaka | 8,562 | 2,280 |
| Mymensingh* | 936 | 197 |
| Tangail | 2,918 | 673 |
| Jamalpur* | 1,722 | 342 |
| Kishoregonj | 2,450 | 524 |
| Faridpur | 23,444 | 3,963 |
| Chittagong | 297 | 74 |
| Ctg. H.T. | 8,138 | 1,515 |
| Noakhali | 765 | 137 |
| Comilla | 5,351 | 1,003 |
| Sylhet | 808 | 200 |
| Rajshahi | 11,114 | 2,928 |
| Dinajpur | 1,306 | 284 |
| Rangpur | 2,094 | 604 |
| Bogra | 697 | 147 |
| Pabna | 16,086 | 4,307 |
| Khulna | 16,459 | 3,774 |
| Barisal | 9,494 | 1,971 |
| Patuakhali | 1,131 | 157 |
| Jessore | 2,980 | 738 |
| Kushtia | 1,334 | 241 |
| Total : | 118,086 | 26,059 |

Source: B.B.S., *Op. Cit.*

* Four years average

Map 10.14



SAFFLOWER & OTHER OILSEEDS *Guji-til*

Gujitil (*Guizotia abyssinica*), known in international trade as Nigerseed, is often grown mixed with mustard. It is used to adulterate mustard oil. It is grown mainly in Jessore district and in the Kharis of the Barind. The Bengal Walnut (*Aleurites molueiana*) yields a nut, rich in oil, which is often used for lighting in the Eastern Region. The related Tung tree (*Aleurites fordii*) is being grown in some of the Sylhet tea gardens. Over 7,000 tons of cotton-seeds are available from the cotton crop, but much of this valuable edible oil-seed is wasted. The acreage and yield of Castor and other oil-seeds (excluding cotton-seed) is given in Table 10.22.

Table 10.21

Ground Nut

Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 | |
|------------------|-----------------|---------------|---------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 7,909 | 3,858 | 8,911 | 2,747 |
| Mymensingh * | 1,713 | 784 | 1,201 | 531 |
| Tangail | 244 | 92 | 691 | 271 |
| Jamalpur | 440 | 199 | 2,413 | 1,154 |
| Kishoregonj | 18,487 | 8,240 | 6,586 | 3,629 |
| Faridpur | 3,796 | 1,645 | 10,863 | 7,080 |
| Chittagong | 2,847 | 1,866 | 2,509 | 2,086 |
| Hill Tracts | 605 | 246 | 485 | 145 |
| Noakhali | 8,195 | 3,950 | 30,393 | 15,996 |
| Comilla | 3,419 | 1,520 | 4,304 | 2,225 |
| Sylhet | 4,819 | 2,680 | 3,330 | 1,096 |
| Rajshahi | 1,050 | 512 | 451 | 182 |
| Dinajpur * | 88 | 30 | 77 | 17 |
| Rangpur | 415 | 203 | 8,919 | 3,046 |
| Bogra | 27 | 11 | 2,638 | 1,962 |
| Pabna | 649 | 316 | 999 | 563 |
| Khulna | 46 | 15 | 330 | 119 |
| Barisal + | 101 | 45 | 4,602 | 2,565 |
| Patuakhali * | 83 | 33 | 3,300 | 1,286 |
| Jessore | 128 | 52 | 1,593 | 783 |
| Kushtia | 336 | 170 | 474 | 207 |
| Total : | 55,397 | 26,457 | 95,069 | 47,753 |

Source: *Op. Cit.*

+ Four years average * Five years average

Table 10.22

Castor & Other Oil Seeds Area : in acres
 Production : in tons.

| Greater District | 1972-81 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 1,362 | 228 | 225 | 50 |
| Mymensingh * | 28 | 7 | 20 | 5 |
| Tangail | 228 | 45 | 175 | 40 |
| Jamalpur | 37 | 10 | 130 | 40 |
| Faridpur | 337 | 58 | 480 | 110 |
| Chittagong | 46 | 13 | 50 | 15 |
| Hill Tracts | 66 | 17 | 25 | 6 |
| Noakhali | 92 | 22 | 170 | 45 |
| Comilla** | 34 | 5 | 90 | 25 |
| Sylhet | 226 | 55 | 175 | 45 |
| Rajshahi | 350 | 88 | 115 | 20 |
| Dinajpur | 21 | 5 | 60 | 15 |
| Rangpur * | 268 | 62 | — | — |
| Bogra | 11 | 3 | — | — |
| Pabna | 201 | 47 | 80 | 20 |
| Jessore | 839 | 136 | 130 | 35 |
| Kushtia | 76 | 15 | — | — |
| Total : | 4,220 | 816 | 2,135 | 550 |

Source: B.B.S., *Op. Cit.*

* Three years average

** Four years average (1972-73 to 75-76)

Aakh (*Saccharum officinarum*) Sugarcane

Sugarcane is indigenous to Bangladesh, having most probably evolved from one of the five species of *Saccharum* found growing wild. It was an important crop before the spread of jute cultivation in the second half of the nineteenth century. Lately it is becoming an important crop again. Sugarcane grows best on light dry soil, preferably sandy silt. It is, however, grown in all types of soils if the crop is meant only for home consumption. The crop is exhausting to the soil, requires much labour and occupies the

land for more than a year. The land is ploughed some time between November and February and heavily manured. Ashes, cowdung, oilcakes and urea are used. When a farmer can afford it, upto 7 tons of cowdung and urea are used. From 10,000 to 20,000 cane cuttings are planted in an acre, the number depending on the variety planted, the soil and the farmer's inclination. The cuttings are planted in trenches, but as the cane grows, fresh earth is heaped round the roots, till gradually the rows of canes are on ridges with shallow trenches between them. In the eastern parts of the

Table 10.23

Sugarcane

Area : in acres

Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|--------------|--------------------|--------------|
| | Area | Production | Area | Production |
| Dhaka | 16 | 252 | 20 | 307 |
| Mymensingh * | 5 | 81 | 7 | 105 |
| Tangail | 3 | 47 | 4 | 52 |
| Jamalpur * | 15 | 285 | 17 | 307 |
| Kishoregonj | 7 | 107 | 6 | 98 |
| Faridpur | 35 | 657 | 51 | 951 |
| Chittagong | 6 | 101 | 5 | 94 |
| Hill Tracts | 2 | 28 | 1 | 14 |
| Noakhali | 6 | 69 | 3 | 42 |
| Comilla | 2 | 23 | 3 | 44 |
| Sylhet | 5 | 94 | 4 | 58 |
| Rajshahi | 79 | 1,487 | 97 | 1,808 |
| Dinajpur | 38 | 452 | 43 | 587 |
| Rangpur | 34 | 584 | 38 | 691 |
| Bogra | 15 | 281 | 12 | 194 |
| Pabna | 24 | 420 | 19 | 313 |
| Khulna | 7 | 129 | 8 | 154 |
| Barisal | 11 | 171 | 9 | 115 |
| Patuakhali | 2 | 19 | 1 | 16 |
| Jessore | 20 | 434 | 27 | 417 |
| Kushtia | 35 | 627 | 50 | 838 |
| Total | 367 | 6,348 | 425 | 7,206 |

Source : B.B.S. *Op. Cit.*

* Four years average (78—79 to 81—82)

Central Region brinjal is intercropped. In Sylhet district, Arhar is grown as a fencing. When the plants are about a metre high, three or four of them are tied together by their lower leaves, to keep them erect and to protect them, to a certain extent, against insects mainly the borer *Chile simplex* and jackals. About September, large clumps are made by tying several stems together, and where the cane grows large, as at Joypurhat and Panchbibi, the clumps are kept upright by bamboo poles. The crop is cut from January to March. The two major diseases of sugarcane in Bangladesh are redrot caused by *Collectorichum falcatum*, and collar-rot caused by *Hendersonia sacchari*.

Ratooning, by which old roots are allowed to sprout and give a second crop, is sometimes practised. Generally, however, since the yield greatly declines in ratooning, the same field is not used in two successive years. The yield varies considerably. In Rajshahi, the Co 313 variety yields 9 to 11 tons of cane per acre, Co 617 yields 10 to 13 tons and Lohardang yields 10 to 15 tons. In Rangpur, the yield is around 13 tons while in Joypurhat Upazila it is as high as 17 tons. In the best fields, on river levees, in Kishoreganj, Netrokona and Barisal districts the yields are from 12 to 16 tons. The average per acre for Bangladesh is 15 tons. The sucrose content varies from 8 to 10% in the better varieties but the average is just about 7.5%. The yield of Gur (*Molasses*) from an acre, therefore, varies from 1 to 2.5 tons. Gur is the form in which most of the sugar is consumed.

Various varieties are grown. Those meant for chewing are Gendari, Bombai and Khagri or Jaliak. The last mentioned can withstand one metre of flooding. The sucrose content is, of course, as a result diminished. Of those grown for extracting Gur or sugar, Co 313, Co 617, Lohardang, Patnai, Samshara, Vendamukhi and Dhali are the most popular. Co 213 was the leading variety till red-rot decimated it in 1939-40. At present the early maturing Co 527 is gaining-most rapidly. Other varieties grown are Khari in Rajshahi, Gendari in Rangpur, Mymensing and Dhaka; Hendamukhi in Rangpur and Bogra; Ikri, Khagri, Kulera and Nara in Barisal and Faridpur, Dhali, Khali and Choonay in Khulna, Jessore and Kushtia; Dhali, Bombai and Khagra in Sylhet. There is a definite concentration of sugarcane growing in certain areas. (Map 10.14). The sandy loam of most of Thakurgaon district is very well suited to the crop. The sugarcane belt east of the Barind is a compact area from Badarganj to Shibganj. The Western Jamuna valley produces the best canes, in Joypurhat, Panchbibi and parts of Dhamoirhat and Badalgachhi. There is another belt along the Ganges levee from Lalpur to Pabna. In the Southern Region there are two main areas, Alamdanga-Chuadanga upazilas and a belt from Barisal to Naria. In the Central Region, the main belt stretches from Narsingdi to

Kishoreganj. There is a small block along the river Suti in Bhaluka and Phulbaria Upazilas. In the Eastern Region the crop is of minor importance. There are small concentration along the banks of the Meghna, the foot of the Lalmai Hills in the sub-montane belt from Belonia to Garjania, and in the valleys of the hills in south Sylhet.

From the sugarcane juice, Gur is made by boiling it in pans over a low fire. Near the factories making refined white crystalline sugar, the crop is grown in blocks and is often regulated by the factory management. In the farms of the Thakurgaon Sugar Mill, yields of upto 70 tons of cane per acre have been achieved. The average yield is low because of red-rot and inadequate fertilisation and irrigation. In the Amla Farm (Ganges-Kobadak area, near Kushtia) timely irrigation has increased yield by fifty per cent. Low sucrose recovery at the mills is due not only to the deterioration of the present varieties but also to the very poor communications. Large quantities are brought to the mills at a time, and so some of the cane dries up two to three weeks before the mills can accept it for crushing.

KHEJUR PALM

The Khejur Palm (erroneously called date-palm) is an important source of sugar in Bangladesh. This palm, (*Phoenix sylvestris*), resembles the date palm, but is much shorter. It is planted along Ails, and grows spontaneously in waste-plots. In certain parts of west Southern Region, however, it is cultivated in regular orchards. The main area of its cultivation extends over Jhikargachha, Kotwali, Bagherpara, Manirampur, Keshabpur, Abhayanagar, Maheshpur, Jhenidah, Kaliganj, Kotchandpur, Phultala, Dumuria, Satkhira, Kalaroa, Jibonnagar, Tala and Chuadanga Upazilas (Map 10.14). In this compact area, there are 20,000 acres under the Khejur Palm : this means some 11 million trees. About 20% of the trees are scattered, i.e., along Ails, in homesteads, etc. The rest are in orchards. Special nurseries are prepared for the palm seedlings. In June and July either seeds or plants which have grown up spontaneously are planted in these nurseries. When these seedlings are two or three years old, they are planted out in the orchards during the monsoon rains. Sandy-clay is said to be the best soil for these palms. They are put 3 meters apart, i.e., 537 to the acre. They have to be carefully looked after since wild grasses, such as Ulu can smother them. In six years time, the palms are fully mature for tapping, but the unjudicious farmer often begins one or two year earlier. The east and west sides are tapped in alternate years, since those are the "Sunny" sides. The tapping season is from mid-October to mid-February. For tapping, the bark is cut off just under the crown of leaves in a

rectangle of about 25 cm. by 40 cm. Ten days after that a 'Y'- shaped cut is made 6 mm. (quarter of an inch) deep to expose the sap wood. A piece of split bambo is placed at the base of the Y-cut to extract the juice in a small earthen pot suspended just underneath. The best juice is obtained at night ; the daytime juice, called Ola, contains little sucrose. The first cut, known as Ieeran, lasts for a month, before it dries up. The second and third cuts, known as Dokat and Tekat respectively, are given at intervals of a month. During the tapping period, the trees are alternately tapped for two or three successive nights, and then left for four nights.

Table 10.24

Area Under Khejur Palm

Area : in acres

Production : in tons

| Greater District | 1972-81 Average | | 1987-88 | |
|------------------|-----------------|----------------|---------------|----------------|
| | Area | Production | Area | Production |
| Dhaka | 643 | 15,698 | 680 | 11,250 |
| Mymensingh * | 60 | 912 | 100 | 1,245 |
| Tangail | 56 | 611 | 115 | 1,355 |
| Jamalpur * | 50 | 512 | 50 | 425 |
| Kishoregonj | 28 | 562 | 45 | 700 |
| Faridpur | 2,537 | 39,251 | 3,155 | 27,750 |
| Chittagong | 332 | 9,241 | 570 | 13,650 |
| Hill Tracts | 50 | 505 | 150 | 445 |
| Noakhali | 579 | 7,326 | 1,750 | 10,125 |
| Comilla | 128 | 3,257 | 320 | 4,840 |
| Sylhet | 35 | 379 | 55 | 190 |
| Rajshahi | 1,453 | 39,082 | 870 | 18,695 |
| Dinajpur | 81 | 1,441 | 145 | 1,280 |
| Rangpur | 122 | 2,344 | 190 | 3,005 |
| Bogra | 336 | 4,457 | 475 | 7,490 |
| Pabna | 162 | 3,582 | 295 | 3,605 |
| Khulna | 4,110 | 81,054 | 3,805 | 42,815 |
| Barisal | 3,009 | 28,481 | 2,800 | 20,600 |
| Patuakhali | 865 | 7,178 | 1,340 | 7,715 |
| Jessore | 10,578 | 142,488 | 4,465 | 34,350 |
| Kushtia | 1,199 | 8,797 | 1,275 | 9,025 |
| Total : | 26,413 | 397,158 | 22,685 | 220,585 |

Source : B.B.S., *Op.Cit.*

* Three years average

The Khejur palm yields for twenty-five years, though some have remained productive fifty years. When young, they are called Chara or Comra, when middle aged they are called Majhari or Nalgas, and when old they are Kakni, or Daria. Nalga gives about 3.5 kg. (8 pounds) of juice per night, while the Daria yields half as much. During the tapping period, on the average, a Nalgas yields 163 kg. (360 lbs). An average acre of Khejur orchard yields 57 tons of juice which boils down to 5.7 tons of Gur (ungranulated brown sugar). The successive stages of boiling are known by the bubbles they form as Makrasha (spidery), Sharishaphuli (mustard-flower-like), Baghani (tiger-like) and Guri (Gur-like). At this last stage the thick juice is taken down and cooled to form Gur, of which three qualities, Patali, Nagra and Ola, are made. The juice collected during the daytime (ola) is used either to adulterate the good juice, or sold as syrup for the preparation of sweetmeats. Dhulua sugar, a soft, moist, powdery sugar is made for sweetmeat preparations. Its method of preparation is to place Sheola (*Vallisneria verticillata*) on baskets of Gur which are placed over open pans. The Sheola moistens the surface so that the molasses part of the Gur drains into the pan and a whitish solid sugar layer is left behind. The Sheola has to be changed after each layer of Dhulua forms and is scraped off. Gur yields forty per cent of its own weight in Dhulua sugar. The last of the molasses which drips down is known as Chita Gur, and is used to sweeten chewing tobacco or make rum.

The Khejur palm is one of the commonest tree in Bangladesh. Only in parts of Southern and North-Western Region and Sylhet and the Hill Tracts is it uncommon. Its growth is prolific on dry soils. Apart from the main area of production, already mentioned, it is plentiful in Faridpur, Bhanga, Madaripur, Harirampur, Pabna, Shujanagar, Santhia, Lalmohan, Hatiya and Ramgati Upazilas. The Hazari Gur of Jhitka, in Harirampur Upazila and the Patali Gur of Faridpur district enjoy a high reputation.

The total area under Khejur palms is estimated at about 26,700 acres, which means a total of 14.3 million trees. Four-fifths of the trees are productive ; their output of juice is estimated at 1,210,000 tons of which three-fourths is made into 90,750 tons of Gur. The Khejur-palm sugar (Khejuri Gur) generally fetches a higher price than sugarcane Gur.

TAL PALM

The Tal or Palmyra Palm (*Borassus flabelliformis*) is another palm from which the juice is extracted for the manufacture of sugar. The Chhau (*Caryota urens*) and Golpata (*Nipa fruticans*) palms can also

yield sugar, but they are not exploited in Bangladesh, though there are an estimated 2,000 hectares under each of them. The Tal palm grows 18 to 24 metres (60 to 80 feet) high, with a dark grey stout trunk and a crown of large, rigid, fan-shaped leaves. It is suited to the drier soils of Bangladesh.

The method of extracting juice or sap from this palm is different from that of the Khejur palm. On these palms the young inflorescence (*spadix*) is tapped before it is fully developed. This is first gently beaten with a mallet, and a couple of days later a slice is taken off the end. A thick shaving is removed from the end of the spadix every evening, and the fresh juice (Toddy or Rosh) is collected every night in an earthenware pot or gourd, suspended close to the cut. A little lie is smeared on the inside of the vessel to prevent the juice from rapidly becoming sour. The process of Gur making is the same as that for Khejur palm juice.

The Tal palm is grown in orchards in the southern Barind Upazilas of Porsha, Patnitola, Dhamoirhat, Adamdighi, Kahaloo, Nandigram, Manda, Singra, Niamatpur, Raninagar, Mohadebpur, Bagmara and Nachole, and in the southern Madhupur Tract Upazilas of Kapasia, Kaliganj, Sripur, Keraniganj and Tejgaon. In the Southern Region it is also extensively grown. Over the rest of Bangladesh, this palm is grown on waste tracts, along Ails or banks of tanks.

Table 10.25
Tal Palm & Its Products in the Southern Region

| Greater District | 1972 - 81 Average | |
|------------------|------------------------------|-----------------------------|
| | Total area under Tal (acres) | Estimated production (tons) |
| Khulna ... | 160 | 2,196 |
| Faridpur ... | 1,141 | 17,226 |
| Barisal ... | 725 | 4,621 |
| Jessore ... | 475 | 9,892 |
| Kustia ... | 134 | 774 |
| Patuakhali ... | 376 | 2,598 |
| Total : | 3,011 | 37,307 |

Source : B.B.S., *Op. Cit.*

Only the mature palms (more than 15 years old) are fit for extraction. The average yielding period is about 50 years. The tapping season lasts from March to August. The female palm yields 50 per cent more than the male. The yield per tree of sugar varies from 27 kg. (60 lbs) (e.g., in Jessore district to 54 kg. (120 lbs.) (e.g., in parts of Khulna district). It is estimated from the 1988 Survey of Farm Forestry that the total area under the Tal palm is about 20,400 acres.

Before 1947, there was a considerable export of Tal sugar to parts of West Bengal. The industry has had a tendency to decline since then. Tree not tapped for the juice bear clusters of round black fruits much used as an article of food. The germinated nuts, with the enlarged fleshy embryos furnish a common vegetable. In some parts of Bangladesh, Santhals and Doms ferment the juice and distil it to make a strong liquor. The young leaf-blades are used to make mats, fans, baskets, hats, etc., while the forked butt end of the leaf-stalk furnishes an excellent bristle-fibre. On an average 20 stalks yield a pound (0.45 kg.) of cleaned fibre.

TOBACCO (Taa-maak)

Over much of Bangladesh, tobacco is a kitchen garden crop, grown in tiny plots near the homestead. In certain well defined areas, however, it attains the rank of an important cash crop (Map 10.15). The fields selected for it are Danga, Faringati or Palan*, where Aus rice is grown in summer. The soil is preferably sandy clay. Seedlings are grown in specially prepared beds in August-September and transplanted when (7.6 cm) three inches in height in October or November. The fields, meanwhile, are ploughed up thoroughly and heavily manured with oilcakes or cowdung. The seedlings are planted in rows about 0.6 metre (two feet) apart, and often shallow drains are scooped out on all four sides of them, so that the field looks like a chess board. The fields are irrigated with temporary Dhenklis (bamboo hoists), which draw up water from a depth of 1.8 to 3 metre (six to ten feet). A few days after transplanting, ashes are worked into the soil, around the roots, as a protection against insect pests. As the plant grows, the lower leaves called Bishpata are plucked so as to keep the number of leaves at five or six. The Bishpata fetches a very low price. The crop is harvested in February-March. The yield, per acre, of dried leaf varies from 454 kg. (1,000 lbs) in the areas beside the Tista river, to between 340 to 385 kg (750 and 850 lbs) in the other main areas of production.

* Nomenclature according to land level and soil texture.

Map 10.15

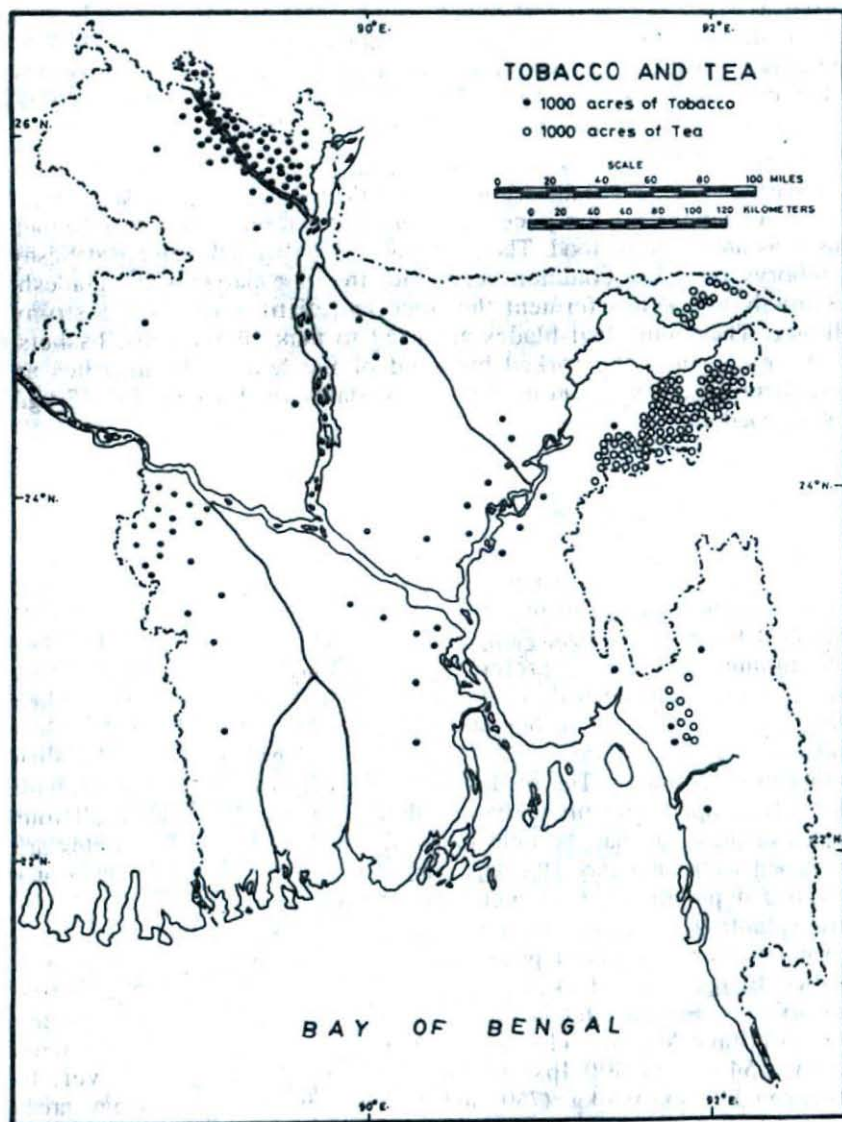


Table 10.26

Tobacco

Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 5,358 | 1,486 | 6,250 | 2,137 |
| Mymensingh * | 1,821 | 545 | 1,180 | 432 |
| Tangail | 2,058 | 546 | 875 | 276 |
| Jamalpur * | 3,332 | 989 | 2,680 | 940 |
| Kishoregonj | 4,555 | 920 | 2,280 | 546 |
| Faridpur | 6,349 | 1,250 | 5,345 | 1,579 |
| Chittagong | 3,001 | 980 | 3,900 | 1,422 |
| Hill Tracts | 1,641 | 410 | 1,755 | 496 |
| Noakhali | 57 | 10 | 5 | 1 |
| Comilla | 4,337 | 935 | 2,595 | 739 |
| Sylhet | 5,821 | 2,003 | 1,250 | 316 |
| Rajshahi | 1,684 | 562 | 860 | 234 |
| Dinajpur | 2,356 | 497 | 1,245 | 279 |
| Rangpur | 61,726 | 25,613 | 63,985 | 25,076 |
| Bogra | 707 | 184 | 535 | 143 |
| Pabna | 1,956 | 734 | 1,065 | 301 |
| Khulna | 1,469 | 329 | 430 | 85 |
| Barisal | 4,160 | 1,137 | 920 | 213 |
| Patuakhali | 1,256 | 237 | 1,015 | 180 |
| Jessore | 3,198 | 1,120 | 3,655 | 1,322 |
| Kushtia | 11,387 | 5,350 | 14,730 | 4,827 |
| Total: | 128,229 | 45,837 | 116,565 | 41,545 |

Source: *Op.Cit.*

* Four years average (78-79 to 81-82)

In the Hill Tracts, there are three types of tobacco : Khoa-Doung, Mri Kheong and Rigre Kheong whose quality is said to be very good. The best of these tobaccos, Rigre Kheong, acquires its best flavour in the Matamohuri valley. Various exotic types of tobacco such as Manila, Sumatra, Pennsylvania, Turkish and Virginia have been grown successfully at Birirhat and other places in Rangpur. Good Maryland

and Virginia leaves have been grown in Comilla district. However, cultivation of these superior leaves has not spread, even though 'the best yellow tobacco can be produced by flue-curing' in the Tista valley. (Biswas 1919)

The tobacco grown belongs to two different species, Deshi (*Nicotina tabacum*) and Bilati (*N. rustica*). The Deshi has smooth, oval leaves of a light green colour, whereas the Bilati has round leaves of a darker green. The main varieties of Deshi in Rangpur district are, Godra, with a thick large leaf, Panpata, the leaf of which is made into Shada; Bhelengi and Noakhali both with small leaves; and Shindur Khati with a leaf of strong flavour. The main varieties of Bilati are : Bilati, Motihari and Hingli, all of which have small round, dark green leaves, crinkly at the edges. Varieties and their names differ from place to place. The varieties commonly grown in some of the other areas of cultivation are :

| | |
|---------------------|--|
| Satkhira district | : Baran. |
| Jessore district | : Hati-kan, Pan-bot, Kafi-pata, Sibijath. |
| Kushtia district | : Hingli, Chhotna, Panbota, Mandhata, Baran. |
| Rajshahi district | : Lotan panbota, Motihari, Gachhbetai. |
| Pabna district | : Dhalpata, Jalibhunj, Jorekata. |
| Dhaka district | : Kattabogi, Siberjata, Bilaikani, Bangla, Hingli. |
| Chittagong district | : Fashia, Kafi. |

When the leaves change from green to a yellowish hue, with brownish spots, they are mature. In Rangpur district they are then cut and spread on the ground to dry. After about 48 hours, they are tied into bundles (Hath or Jhaka) and slung on poles, inside the cowshed, to dry further. When the leaves turn light brown in colour, they are collected in bundles (Peti), and heaped up with the stalks outwards and the leaves spread flat for fermenting. After a few days of this, the leaves are ready for sale. In the Southern Region the leaves are hung up till winter sets in. Then they are heaped on floors where bamboos and straws have been placed to keep them from getting damp. The fermentation is checked by breaking up the heaps from time to time. In Rajshahi district the leaves are pressed for 48 hours between layers of Ulu grass after they have dried. In the Hill Tracts, the farmers use special shacks for drying the leaves. Flue-curing has been found to produce a superior quality of leaves, and flue-cured is now produced in the irrigated areas of Thakurgaon and Kushtia.

Ganja : Indian Hemp

Indian Hemp (*Cannabis sativa*) yields three drugs., known as Ganja, Charas and Bhang. It is grown on small carefully cultivated plots, on an average one-third of an acre in size. The male plants are uprooted as soon as they can be recognised. The female plants are harvested in January and gathered in small plots known as Charar. Here the drugs are prepared in a crude form. Ganja comes from the dried flowering tops of the female plants, which is coated with resin. As the flowers have not been pollinated, the seeds are not shed. Charas is made from the resin, and Bhang (Marijuana) from the dried leaves. Charas, under the name Hashish, has international notoriety. The cultivation of Indian hemp is strictly controlled to a tract of land in Naogaon, Mahadebpur and Badalgachhi Upazilas and the licensed area has been reduced to about 3 acres.

TEA (Cha)

Tea (*Thea camellia*) was found to be native in the Brahmaputra valley of Assam in 1823. It was found in the wild state in the Surma valley in 1855. The first garden in the latter area was started in 1857 at Malnicherra. The first garden in Chittagong district was started in 1862. In the next half a century the number of gardens in the areas now in Bangladesh increased to over one hundred. At present there are 110 gardens in Sylhet district, 35 in Chittagong district, 1 in the Hill Tract district and 1 in Comilla district. The area under tea was 78,000 acres in 1959-60 and 90,000 acres (35,000 ha) in 1966-67. By 1987-88, the area under was estimated at 112,000 acres (44,000 ha). The gardens usually hold 2 to 5 times the amount of land they put under tea : the rest being built-up area, scrub jungle, rice fields, etc.

The tea bush grows best in soils with PH 5.0 - 5.5 (Kawashima 1938). The test soil of the gardens in Bangladesh varies in PH from 4.3 to 6.8. The range is generally between 5.4 and 5.9. and are quite suitable, for tea. But the low height of the gardens makes their climate only slightly sub-tropical, which tends to make the tea strong in colouring but poor in aroma. The rainfall in the tea growing areas is over 200 c.m. : most of the gardens record over 250 c.m.

When new gardens are laid out, two-year old seedlings are planted on the fields in rows. These rows are 1.5 metre apart with the plants in a row, 60 to 76 metre apart. Formerly, planting in square or triangular pattern was common but this is giving way to planting in rows. Wherever

Table 10.27

| Greater District | Tea | | Area | Production |
|------------------|---------|------------|---------|------------|
| | 1972-82 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Chittagong | 7,597 | 1,339 | 7,706 | 1,608 |
| Hill Tracts+ | 148 | 8 | 156 | 4 |
| Comilla * | 53 | -- | 108 | 3 |
| Sylhet | 95,919 | 32,256 | 106,748 | 38,996 |
| Total : | 103,717 | 33,603 | 111,604 | 40,611 |

Source : B.B.S., *Op. Cit.*

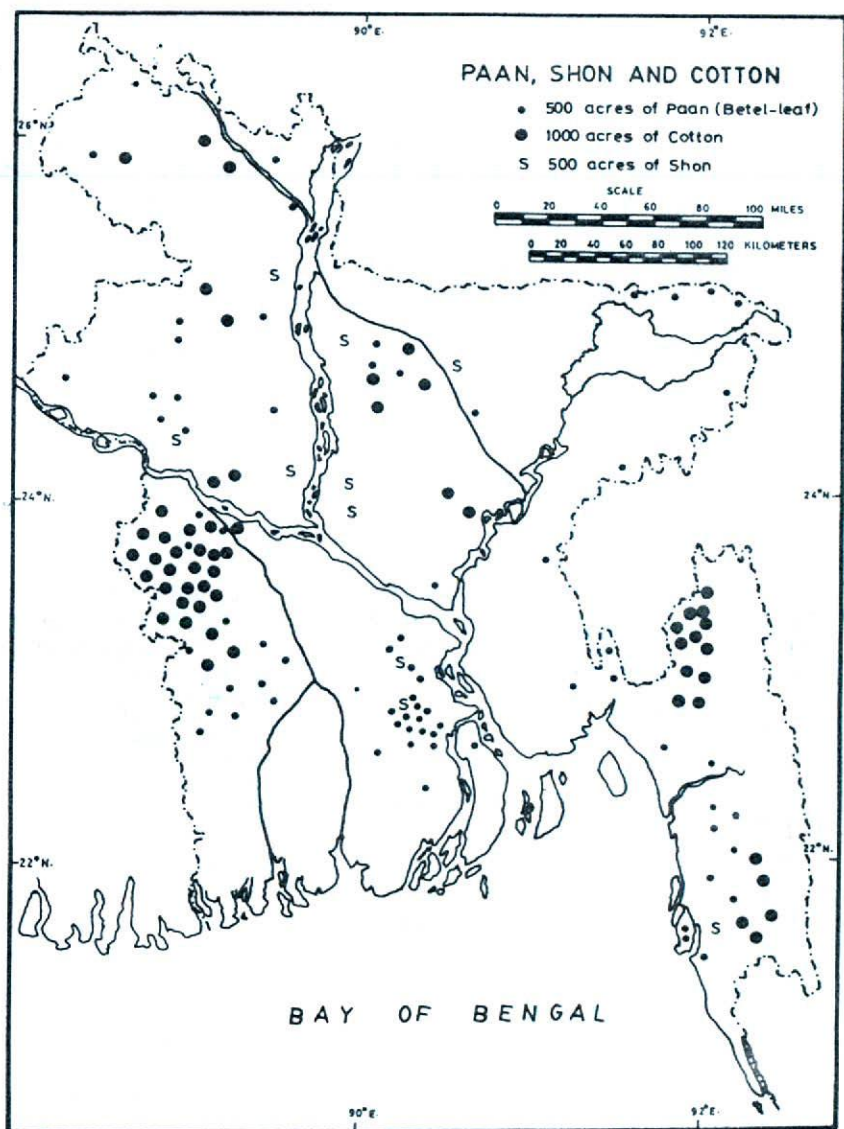
+ Seven years average

* Four years average

a seedling dies a fresh 'infil' is put in. Shade trees, mainly *Albizia procera*, *Derris robusta*, *Erythrina indica* and *Cassia siamea*, are planted at 6 to 18 metre intervals. Quick growing *Tephrosia candida* and *Corotolaria anagyroides* are also planted, but are lopped regularly and after 3 years are removed and made into mulch. The heavy tree cover of tea may be dispensed with in future. Sluce tea has been successfully grown without shade in the Sylhet area. Mash pulse is sometimes inter-cropped. The application of ammonium sulphate in early summer greatly increases the yield. In some gardens 36 to 45 kg. of ammonium sulphate per acre is used. In others, 27 kg. of murat of potash and 9 kg. of superphosphate per acre are used. In most of them leaf compost is also added at a rate varying from one to eight tons per acre.

The tea bushes are dormant from mid-December to mid-March. They are pruned in this period in alternate years. Sometimes the pruning is in 6 year cycles : the bushes are allowed to grow upto 1 metre in 6 years and then cutback to 69 cm. in the seventh year. The harvesting period is from mid-April to mid-December, a month being allowed at the end of the dormant period for the bushes to bring forth new flushes. The flushes of two leaves and a bud are plucked from the bushes at seven to ten days intervals. In some gardens a few other tender leaves besides the flush are also plucked. This work is done by women, who carry large baskets slung on the back, into which they collect the leaves. The harvest varies from 136 to 680 kg. per acre. The yield is affected by several factors, of which the main are climate, age of bushes and soil. Moreover, where

Map 10.16



the Lang's Factor of the climate is around 90, yields are said to be maximum. The age of the bushes is very important too. Older gardens invariably get lower yields than newer ones, other conditions being more or less the same. It has been found that yields differ considerably in relation to the soil texture. Where the soil is clay loam the yield is generally around 181 kg. per acre, which verges on being uneconomic. In sandy loams the yields of 204 to 340 kg. per acre range from fair to good. In loamy sand the yields are definitely good, varying from 340 to 567 kg. The highest returns are obtained from sandy clay loam soils, where yields of 567 kg and more are not uncommon.

Hail, storms and drought often reduces the potential yield. The Red Spider (*Metatetranychus biocultus*), Looper Caterpillar (*Biston suppressaria*) and Mosquito Bug (*Helapeltis theivora*, *H. febriculosa*, and *H. antonii*) are serious pests of tea plants. Crickets, termites, pink and purple mites, Tea eelworm, Nectria, Red Rust, Violet Rot (*Sphaerostilbe repens*) and Black Rot (*Corticium thea*) are among the many pests and diseases which continually threaten the plants.

The greater part of the harvest is made into black tea. To do so, the leaves are rolled, fermented and fired (dried). Previously the leaves were first withered for 18 to 24 hours, but this has been abandoned by almost all gardens. The black tea is the common form of leaf used in Bangladesh and most other places. A certain amount of green tea is also made. Most of the indigenous teas are blended with more aromatic teas from Ceylon and India. On an average 1.8 kg. (four pounds) of green leaf makes 0.4 kg. (one pound) of tea. The grades of black tea prepared are Broken Orange Pekoe, Orange Pekoe, Broken Pekoe, Fannings and Dust. Dust seems to be most plentiful blend in the internal market.

The production of tea has gone up steadily from 11,817 tons in 1971-72 to 38,161 tons in 1981-82. The area under tea has increased only by about 1,600 acres during this period. At present 103,419 acres (40,716 ha) of garden are in Sylhet district and 8,123 acres (3,198 ha) in Chittagong and Hill Tracts district (Map 10.15).

PAAN

Paan, the Betel Vine (*Piper betle*), is an important crop in certain areas. The leaf of this vine is a very common masticatory, being chewed with slices of betelnut, and a thin coating of catechu and lime. The hardened chewers even add a piece of half-cured tobacco, known as Shada. Formerly only the Barui caste of Hindus used to cultivate

Table 10.28
Paan (Betel Leaf)

Area : in acres
Production : in tons.

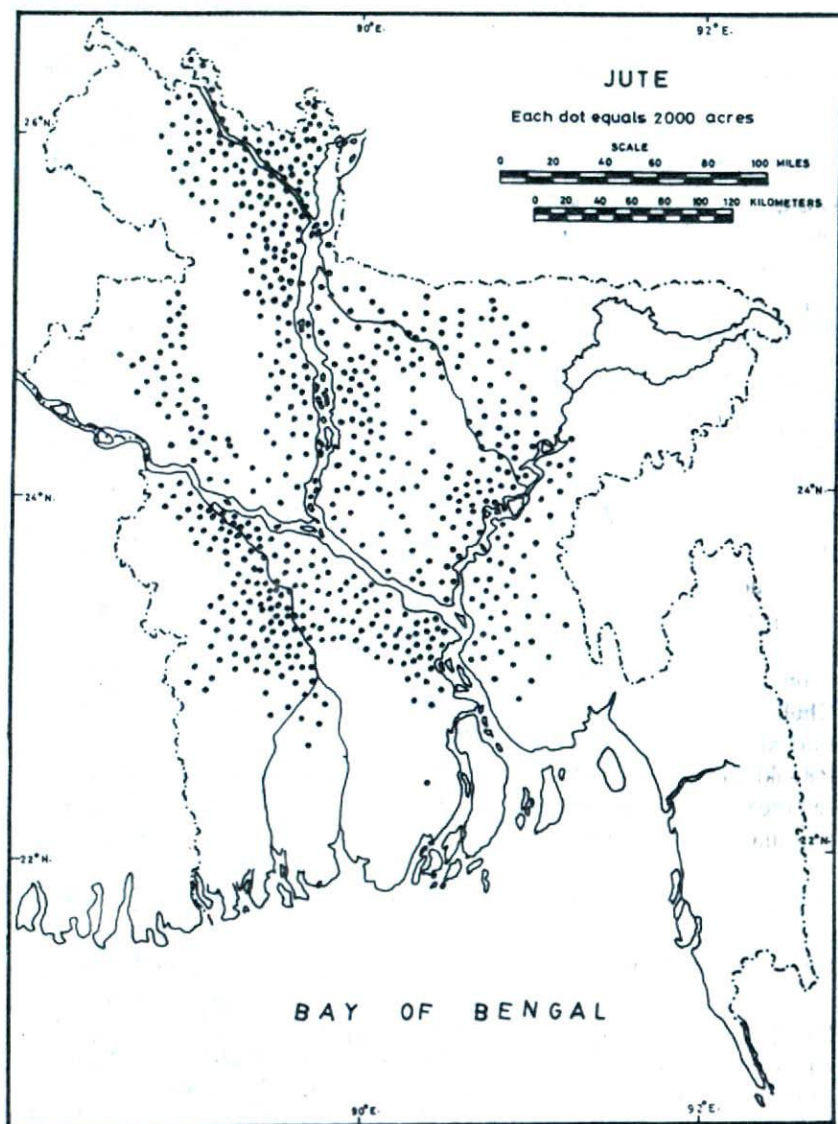
| Greater District | 1972-82 Average | | 1987-88 | Production |
|------------------|-----------------|------------|---------|------------|
| | Area | Production | Area | Production |
| Dhaka | 1,506 | 5,311 | 690 | 1,715 |
| Mymensingh * | 672 | 1,656 | 565 | 1,400 |
| Tangail | 189 | 460 | 190 | 420 |
| Jamalpur * | 148 | 376 | 160 | 450 |
| Kishoregonj | 277 | 631 | 285 | 535 |
| Faridpur | 1,239 | 2,626 | 1,250 | 3,365 |
| Chittagong | 3,354 | 5,921 | 4,005 | 8,370 |
| Hill Tracts | 150 | 143 | 230 | 155 |
| Noakhali | 846 | 1,381 | 1,280 | 2,265 |
| Comilla | 324 | 680 | 370 | 820 |
| Sylhet | 1,541 | 2,639 | 3,110 | 3,560 |
| Rajshahi | 3,242 | 7,579 | 3,665 | 3,435 |
| Dinajpur | 343 | 512 | 485 | 800 |
| Rangpur | 2,104 | 2,389 | 980 | 1,230 |
| Bogra | 544 | 1,501 | 355 | 805 |
| Pabna | 227 | 479 | 170 | 345 |
| Khulna | 1,722 | 4,628 | 2,620 | 2,940 |
| Barisal | 6,384 | 9,117 | 8,080 | 14,130 |
| Patuakhali | 412 | 620 | 615 | 915 |
| Jessore | 1,109 | 2,414 | 2,385 | 5,240 |
| Kushtia | 1,454 | 3,306 | 1,390 | 2,975 |
| Total: | 27,787 | 24,369 | 32,880 | 64,870 |

Source : B.B.S., *Op.Cit.*

* Three years average

Paan, since tradition and superstition barred others from taking it up. At present, however, Muslims form a large part of its cultivators. This vine needs very careful tending and is thus grown in especially constructed enclosures known as Paanboro which consists of a raised platform of earth half to one metre (two to three feet) high, and covering an area between one-tenth to one-third of an acre, surmounted by a

Map 10.17



rectangular shed of split bamboo roofed with thatching grass. Inside this enclosure the vines are planted in rows at the rate of 2,000 cuttings per acre, and trained up sticks of split bamboo. The Paan vine needs shade and warm and damp atmosphere. The Paanboro provides shade and keeps the air inside equably warm and damp. The vines bear sizeable leaves from the year after planting for a number of years, excepting the Gach variety, which is an annual plant. Planted in September or October, the leaves are harvested from January to May, and pulled out when it dies a month or two later. The yield of leaves per acre is estimated at 3.5 to 4 million annually. On good loamy soil, a Paanboro lasts upto 20 years, but on poor soils it is productive for only 3 years. It is a very exhaustive crop, and manuring is often required.

A number of varieties are grown and some areas have specialised in one or more of them. The most common variety is Bangla with a large astringent leaf. A sub-variety of it, known as Deshi, is grown in Munshiganj. Nearby Sonargaon grows the well known Paan. The Ghazipuri variety, which has a milder tasting leaf, is extensively grown in Noakhali. The Dhaldo of Barisal is sweeter. Barisal also grows a small-leaved variety known as Maghi. The sweet-leaved Paan known as Mitha, is grown mostly in Moheshkhali and Teknaf Upazilas and Khulna and Satkhira districts. In Rajshahi the most common variety is called Bot; the aromatic Sanchi leaf is also grown mainly in Cox's Bazar, Rajshahi and northern Rangpur.

Paanboros are, as a general rule, near some small river, for the Paan vine needs a rich moist loam. The distribution of Paan cultivation brings out this fact clearly (Map 10. 16). There are Paanboros for example, on the banks of the rivers Ichhamati (P), Ghaghat, Bhairab, Karatoa, Manu and Chhoto Feni. The cultivation is, as a result, very localised. Half the crop is obtained from seventeen Upazilas - Bagherhat, Satkhira, Bheramara, Mirpur, Abhoynagar, Mohanpur, Bagmara, Durgapur, Gournadi, Munshiganj, Tongibari, Serajdikhan, Kulaura, Companyganj, Shondip, Moheshkhali and Teknaf.

FIBERS

Jute (Paat)

Upto the first quarter of the nineteenth century, cotton was the most important cash crop of the areas now in Bangladesh. With the deliberate choking of the textile industry by the East India Company, cotton cultivation declined rapidly. Indigo took over and remained paramount

for the next half a century. In this period the economy was gradually made increasingly dependant on world markets. With the rapid expansion of international trade consequent with the industrialisation of Britain, a cheap packaging material was found to be very necessary in which to ship the large quantities of cereals which Britain began to import. Jute was soon found to be the answer. It had been grown since ancient times for its fibre from which rope, paper and even cloth used to be made for local use. The demand for it grew so rapidly that even before the Indigo Riots led to the decline of the Indigo Industry, it had become the major cash crop in the areas now in Bangladesh. Thus jute has held its extremely important position in this region for about a century now. The jute growing areas have become increasingly dependant on international markets in that same period.

The best fibre is obtained from two species of the *Corchorus* genus, *C. olitorius* and *C. capsularis*. The former is known as Tossa Jute or Tosha Paat, and the latter is known as White Jute or Deshi Paat. Tossa Jute cannot withstand flooding and is grown only on high-level fields. White Jute on the other hand, can, in its later stages of growth, withstand up to 1.5 metre (five feet) of flooding. Both species grow best on sandy loam soil. White Jute is sown in February and March on low-level fields, and in March and April on medium and high-level fields. It is harvested from June to August. Tossa Jute is sown on high-level fields in April and May and is harvested in August and September. The plants grow 1.8 to 2.7 metre tall. They may be cut at different stages of growth, i.e., when in bud, or in flower, or when the fruit is forming or ripening. They are generally cut when the fruit is forming. The fruit of white jute is globular, while that of Tossa is cylindrical. Other differences between the two species are that white jute has thick dark green leaves and green stems, while Tossa thinner, light glossy green leaves and slightly reddish stems. White Jute is in some places (e.g., Sarail Upazila) cut from boats because there is normally several metres of water on the fields. When the flooding is more than (1.2 metre) four feet, the plants are cut by diving under water. It is doubtful whether any where else in the world a crop has to be harvested with such difficulty.

The average yield of fibre is 726 kg. from an acre (1844 kg/ha). Three different zones are recognised from which the quality and the quantity of fibre obtained differs. The Zones are Jat, District and Northern. The Jat Zone, comprising Mymensingh, Dhaka and Comilla districts, is said to produce the best jute. In this area the average yields per acre of Tossa and White Jutes are 907 kg. and 726 kg. respectively. The Northern Zone, comprising Dinajpur, Rangpur, Bogra and Rajshahi districts averages 635 kg. and 544 kg.

for Tossa and White Jutes respectively. The quality in the Northern Zone is the poorest of the three zones. On the other hand, the very fact that fibres do not form well, induces good seed formation. It is for this reason that the biggest jute seed multiplication farms are in Dinajpur district. The District Zone includes all other districts, and the average yields there for Tossa and White jute are 726 kg. and 635 kg. respectively. Tossa jute is not only superior to White jute in quality but its yield per acre is more. Its cultivation is, however, severely restricted by the amount of high-level fields left over after the Aus rice is sown. From the farmer's point of view, rice is the more important crop and so it gets priority. Tossa jute has to compete with Aus for high-level fields in summer and the state of the previous years' prices will determine how much of each will be planted. The main jute growing zone is a north-west to south-east belt from north Rangpur district to west Noakhali district (Map 10.17).

Research to improve the quality of jute began in 1905. In the next thirty years, three high-yielding varieties of White Jute - Kakiya bombai, R-85 and D-154, and three of Tossa jute - R-26 R-27 and Chinsurah Green (C.G) were evolved. Kakiya Bombai and R-85 were later rejected because of their susceptibility to Chorosis, and R-26 and R-27 were rejected because they did not yield as much as C.G. The other two, D-154 and C.G. have been the staple varieties for long. Recently new varieties such as C-320 and C-322 of White Jute and 0-632 and 0-753 of Tossa jute have been proved superior to those older two and they are replacing them. The varieties grown yield from 5 to 8 % of their weight in fibre, which is rather low for a fibre yielding plant.

After harvesting, the plants are tied up in bundles of 14 to 18 kg. These are retted rotten by submerging them under loads of banana stalks or water hyacinth or even mud, in stagnant pools. The quality of the water determines, to a great extent, the lustre of the fibre. The retting period varies from 7 to 25 days, depending on the variety of jute, the quality of water, the weather prevailing, the stage at which the plants were cut, etc. When retting is complete, the bundles are taken out and the fibre is deftly separated from the sap stick. It is spread out to dry, before being tied into bundles and sold.

Nearly half the fibre, by weight, is obtained from the bottom part of the plant. The fibres at the bottom of the plant are fully formed when they begin to form at the top, so that by the time the plants are cut, the bottom fibres are thicker than those at the top. This makes a lot of difference in the quality and ultimate price. The grading and marketing of jute is discussed in Chapter 16. In 1947, East Bengal produced nearly 75% of the world's jute. India did not want to depend on Pakistan

for the raw jute she needed for her factories, and so within a few years she tripled her output. In 1988-89 Bangladesh produced only about 38% of world's raw jute.

The main use of jute is that it can be woven into cheap bags and clothes. These bags are used for packing rice, sugar, coffee, fertilizer, wool and other commodities. Jute cloth is used for wrapping cotton bales, machinery, etc., when they are transported. Jute is used for backing woollen carpets or is woven into full jute carpets. Jute tapestry (as a form

Table 10.29

| Greater District | Jute | | Area : '000 acres Production : '000 bales. | |
|------------------|-----------------|-----------------------|---|--------------|
| | 1972-82 Area | Average Production | 1987-88 Area | Production |
| Dhaka | 143 | 495 | 109 | 379 |
| Mymensingh * | 175 | 474 | 85 | 367 |
| Tangail | 113 | 330 | 71 | 260 |
| Jamalpur * | 98 | 289 | 48 | 210 |
| Kishoregonj | 124 | 310 | 46 | 169 |
| Faridpur | 175 | 534 | 153 | 527 |
| Noakhali | 15 | 44 | 3 | 7 |
| Comilla | 95 | 324 | 53 | 224 |
| Sylhet | 11 | 26 | 3 | 9 |
| Rajshahi | 56 | 163 | 57 | 183 |
| Dinajpur | 69 | 179 | 79 | 250 |
| Rangpur | 316 | 968 | 256 | 917 |
| Bogra | 46 | 135 | 25 | 96 |
| Pabna | 67 | 201 | 49 | 170 |
| Khulna | 36 | 98 | 18 | 74 |
| Barisal | 18 | 40 | 8 | 13 |
| Patuakhali | 1 | 2 | 1 | 2 |
| Jessore | 157 | 503 | 147 | 605 |
| Kushtia | 67 | 191 | 55 | 238 |
| Total : | 1,782 | 5,306 | 1,266 | 4,700 |

Source B.B.S. *Op. Cit.*

* Five years average (77-78 to 81-82)

of art). Canvas, Tarpaulin, roofing felt, upholstery, cable core, twine and cord are also made from it. The manufacture of jute silk has had a fair measure of success. Jute products are easily bio-degradable. This quality is making jute nets (called Geojute) more environmentally acceptable vis a vis synthetic nets for erosion control, embankments and poulder walls.

Cotton (Tula)

Cotton has been cultivated in Bangladesh since very early times. The variety (or varieties) cultivated then is as yet disputed. In 1826, Luillier mentioned that the cotton plants of this area were three feet (0.91 metre) tall. Mr. Bebb, Commercial Resident at Dhaka, wrote in 1788 that the local cotton is 'the finest cotton in the world'. Henry Tucker was more specific when in 1829 he stated that 'the fibre is extremely fine, silky and strong but the staple is very short and the wool adheres most tenaciously to the seed' (Evens 1921). From this, it is certain that the cotton grown was not *Gossypium arboreum*

Table 10.30

Cotton

Area : in acres
Production : in bales.

| Greater District | 1972-81 Average | | 1987-88 Production | |
|------------------|-----------------|--------------|--------------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 407 | 239 | 1,093 | 2,360 |
| Mymensingh | 97 | 27 | 944 | 378 |
| Tangail * | 14 | 6 | 1,140 | 1,824 |
| Hill Tracts | 10,308 | 3,523 | 8,293 | 164 |
| Dinajpur * | 346 | 188 | 316 | 677 |
| Rangpur * | 1,548 | 524 | 816 | 620 |
| Bogra | 347 | 165 | 850 | 679 |
| Pabna | 89 | 57 | 931 | 13,867 |
| Jessore | 1,200 | 786 | 7,590 | 10,222 |
| Kushtia | 1,436 | 1,333 | 5,775 | |
| Total : | 15,792 | 6,848 | 27,748 | 30,791 |

Source : B.B.S., *Op. Cit.*

* Three years average

and the staple was not long, though some scholars felt sure that muslim of great fineness cannot be woven from short stapled cotton. Watt described this elusive species as being more erect than the common cotton of India, and as having fewer branches, deeply indented leaves, and a reddish tinge over the whole plant. From the various cottons described by G.A. Gammie (1907), it seems almost certain that this ancient cotton was *Gossypium neglectum* variety *vera* sub-variety *bengalensis*. Evans (1921) described the cotton at present grown as *Gossypium arboreum* variety *neglectum*. This variety, however, is non-existent in Gammie's classification. He classified the Garo cotton (grown in the Susang Hills) as *Gossypium cernuum* variety *silhetensis*. Mukerji (1907) referred to this as *Gossypium religiosum*. At present, the cultivation of cotton is practically restricted to the Susang Hills and the Hill Tracts district (Map 10.14), though hardly a century back it used to be grown in the Northern and Central Regions and even Barisal (Mukerji 1907). In the Susang Hills, *G.cernuum* var. *silhetensis*, with Khaki lint, is grown. In the other area there are three types : Phul Shutta, with white lint (probably *G. neglectum* var. *vera* sub-var *burmanica*), Beni Shutta, with Khaki lint (probably the same as the Susang Cotton) and Nahuli (*Gossypium arboreum*). This last variety is cultivated sparingly in other parts of Bangladesh, for the sacred thread of the Brahmins is made from its lint. It grows about 2 metres (more than 6 feet) high, yields 4.5 kg (ten lbs) or more of lint per year, and bears for about ten years. The staple of this cotton averages 3.4 cm. (Gammie 1907). The staple of the other cottons averages 1.65 c.m.

Both in the Susang Hills and the Hill Tracts district, it is cultivated without much care. In the latter areas, it is part of the many crops that struggle for existence in the Jhums. It is sown broadcast in April-May. The harvest lasts from October to December, and the yield of ginned cotton per acre is about 63.5 kg. Annually only 40 acres of cotton are grown in the Susang Hills, while 12,000 acres are grown in the Hill Tracts district (Table 10.30). The short-staple cotton of the Hill Tracts district is known in international trade as Comilla Cotton. It is mixed with wool for various uses. Very long staple American cotton (*G.hirsutum*) has been grown successfully at Rangamati, but its extension to the farmers remains to be carried out.

Mesta (Hibiscus cannabinus)

This elegant plant is widely cultivated, often side by side with jute. Its strong and silky fibre is known in international trade as Rozelle Hemp. It is used in the manufacture of ropes, twines and canvas. The leaves and

fruits of the plant are eaten. It is sown, in low fields, in February-March and harvested four to five months later. In 1977-81 period the average annual acreage for this fibre crop was 24,295 and the production was 69,150 tons. It is widely cultivated in Rangpur, Dhaka, Faridpur, Mymensingh, Tangail, Jessore and Barisal. The 1987-88 figures for the seven main producing districts were :

| | | | | | |
|------------|---|------|-------|------|-------|
| Rangpur | - | 3735 | acres | 8665 | bales |
| Jessore | - | 990 | " | 3060 | " |
| Dhaka | - | 2095 | " | 4105 | " |
| Mymensingh | - | 970 | " | 2840 | " |
| Tangail | - | 860 | " | 1670 | " |
| Barisal | - | 1330 | " | 2210 | " |

Only a twentieth of the production is used in Bangladesh and the rest is exported. The amount exported varies considerably from year to year.

Kapok (*Ceiba Pentandra*) &
Shimul Cotton (*Salmalia Malabarica*)

The Kapok of Indonesia and other South-East Asian countries is obtained from *Ceiba pentandra*, which is now a common tree in Cox's Bazar district, but is virtually unknown in other parts of the country. Though Shimul is from another species of tree, it is very similar, being soft, silky and light. It is used in upholstery, life belts etc. The tree fruits in February and the floss is gathered in March. Shimul is rarely planted. It is found in waste-land or along the ails of the fields. The seeds, which are plentiful, yield an oil similar to that from cotton seed.

Shon or Sun-Hemp (*Crotolaria juncea*)

Shon is grown both as a Bhadoi and as a Rabi crop. The Rabi crop is the important one, the Bhadoi being usually for green manuring. It is grown exclusively as a Rabi crop in Barisal, Chittagong Hill Tracts, Noakhali and Comilla and exclusively as a Bhadoi crop in Jessore and Kushtia. In the major production areas it is a Rabi crop. When grown for fibre, it is harvested and dried in the fields, before retting it and stripping the fibre as from jute. The strong, silky fibre is much in demand for strong cordage. Most of the fishing nets are made from it, some is exported. The main areas of production are Madaripur and Sirajganj district. The fibre from Madaripur is considered to be the best grown

anywhere. The total production of this fibre has fallen steadily since 1948-49. The increasing demand for rice may reduce its cultivation even more.

Table 10.31

| Greater District | Shon (Sunhemp) | | Area : in acres | Production : in tons. |
|------------------|----------------|------------|-----------------|-----------------------|
| | 1972-81 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 446 | 750 | 97 | 135 |
| Mymensingh* | 26 | 42 | 53 | 92 |
| Tangail | 694 | 798 | 372 | 702 |
| Jamalpur* | 130 | 235 | — | — |
| Faridpur | 2,138 | 2,505 | 650 | 1,159 |
| Chittagong | 463 | 1,001 | 31 | 80 |
| Rajshahi | 243 | 323 | 18 | 18 |
| Rangpur | 1,275 | 2,004 | 73 | 144 |
| Pabna | 4,317 | 5,529 | 156 | 179 |
| Barisal | 1,027 | 2,092 | 196 | 481 |
| Total : | 10,759 | 15,279 | 1,646 | 2,990 |

Source: B.B.S., *Op. Cit.*

* Three years average

OTHER FIBRES

Among several minor fibres, Ramie (*Boehmeria nivea*) is the most wide-spread. Its very strong and silky fibre is used for fishing nets. Sida (*Sida rhombifolia*) is also commonly cultivated, but for medical use. Experiments have evolved as tall type which yields a glossy, soft fibre superior even to first quality jute (Chowdhury 1961). Several promising fibre plants are - Sisal (*Agave sisalana*), which should do well in the Barind; *Hibiscus sabdariffa* var: *altissima*, which yields a fibre superior to jute; and Flax (*Linum usitassimum*) which has been very successfully grown in the Northern Region (Chowdhury 1961). If the jute market falls, the production of these fibres will possibly increase.

SERICULTURE

Sericulture was a major occupation from the sixteenth to the eighteenth century when a lot of silk used to be exported. From the near extinction of this industry in the nineteenth century it has recovered slightly and silk will probably gain increasing importance as the textile fibre next to cotton and jute.

The main areas for sericulture are Pabna, Rajshahi, Nawabganj, Shibganj and Bholahat Upazilas in Rajshahi district. The worms are reared on Bengal Mulberry, known as Sultani Toot (*Morus alba* var. *indica*). The Mulberry is grown on raised plots : when setting out a new plot, the cuttings are planted in June-July. Once established, the plants are kept trimmed to a height of about one metre. The leaves are harvested almost throughout the year : only in January and February is some respite given. The average harvest of leaves per acre is about 4536 kg. or 4.5 metric ton. The area under Mulberry is about 1,500 acres. Three varieties of cocoons are raised : Chhotopulu (*Bombyx fortunatus*), Nistari (*B. croosi*) and Boropulu (*B. tator*). Chhotopulu gives the cold weather crop and Nistari the warm weather crop ; Boropulu is uncommon. Twenty to forty days after the eggs hatch, the silkworms begin to spin. They are put in a bamboo spinning frame known as Chandraki and spinning takes about three days. The cocoons meant for spinning are killed either by drying them in the sun or in steam. The cocoons for breeding are kept separate and from them the moths emerge a fortnight or so after the others have completed spinning. The eggs are soon laid and the new brood hatches in another fortnight. Thus the cycle is complete in fifty to eighty days, depending on the season. On an average there are six cycles in the year (*Nistari*, is, however, *octovoline*). There are three seasons for cocoon rearing known as Bands. The best Bands are that of November-December and March-April while that of June-July is poor, since the silkworms spin the best silk in the cool weather.

Several diseases affect the cocoons, of which Pebrine, Muscardine and Grasserie are serious. A fly, *Tricolyya bombycis*, also causes considerable damage. Silk reeled without much care as to evenness of colour, size is known as *Khamru*, while that reeled with regard to evenness of colour, size, and elasticity is filature silk. From 18 kg. (40 pounds) of Mulberry leaves, the average out turn is 0.9 to 1.4 kg. (2 to 3 pounds) of filature silk or to 12.2 kg. (5 pounds) of *Khamru* silk. The 1961 production of raw silk was just over 27.2 metric ton. This is much less than it could be. The production of silk yarn decreased further after Liberation. In 1975-76 only about 14.5 metric tons (32,000 lbs.)

of silk yarn was produced. The production rose to 28.1 metric ton (62,000 lbs.) in 1979-80. Again in 1980-81 only 25.8 metric ton (57,000 lbs.) of silk yarn was produced.

In 1832 the East India Company had two silk factories in Rajshahi district and some years later the out-turn of the filatures in that district alone reached as much as 181.44 metric ton (400,000 lbs.). By the end of the century, the industry had declined and the average production of the three years ending 1899-1900 was 43.85 metric ton (96,864 lbs.) [De 1917]. Since a good part of the silk producing area of the former Malda district is now in Rajshahi district, it is possible that area alone can in time, produce half a million pounds of raw-silk. Efforts at extending sericulture are being made and the industry seems to be catching on in Sherpur, Jamalpur, Gazipur, Bogra, Chittagong and other districts. There are, however, some inherent disadvantages in the present system of sericulture in Rajshahi district. The length of fibre per cocoon of the local varieties averages only 229 metre as against 732 metre from *Bombyx mori* (De 1917). Secondly, the trimmed bushes of *Morus alba* var. *indica* give a relatively poor harvest. Experiments carried out several decades ago have shown that *Morus alba* var. *japanica* or var. *philippinensis* give better results (De 1917). It is possible that after the recent expansion of the industry, it will seek out better breeds of silkworms and Mulberry and improve the silk thereby.

Rough silks were prepared in the north of Sylhet district from the cocoons of *Attacus ricini*, from which the moths were allowed to escape. This was known as Erisilk. Muga silk from (*Antheria assama*), Tassar silk from (*Bombyx tassar*) and silks from Bengal Tassar (*Antheria mylitta*) and Barapat (*Bombyx arracanensis*) are prepared but rarely.

LAC

The cultivation of lac is limited to Shibganj and Nawabganj Upazilas in the west of Rajshahi district. Lac is reared on Boroj (*Zizyphus jujuba*) trees. The brood-lac needed is either from the farmer's own previous crop or brought on sticks. There are two crops; Baishakhi (June-July) and Kartiki (September-October) but impregnated trees bear only once a year. The Baishakhi crop takes eight and a half months to be ready whereas the Kartiki takes three and a half months. Thus the proportion of resin to lac dye is greater in the Baishakhi than in the Kartiki crop (Misra 1923). The trees are pruned in the cool weather and the new shoots are inoculated when a crop is needed. Of several pests, the borer, *Indarbela tetraoins*, is the most damaging. Formerly a good

amount of lac was reared in the east of Sylhet district on *Ficus religiosa* and *Ficus cordifolia* (Jhuri), but the industry has died out. The total production of lac is estimated at ten thousand pounds.

KHOIR OR CATECHU

Catechu is the resin of *Acacia catechu*, used mainly with the masticatory Paan. It is produced all along the North Ganges levee and Charghat is the centre of the producing area. Nearly half the production is of the Janakpuri quality. Due to excessive felling of Khoir trees production is at a very low level at present.

Patipata (*Phrynium dichotomum*)

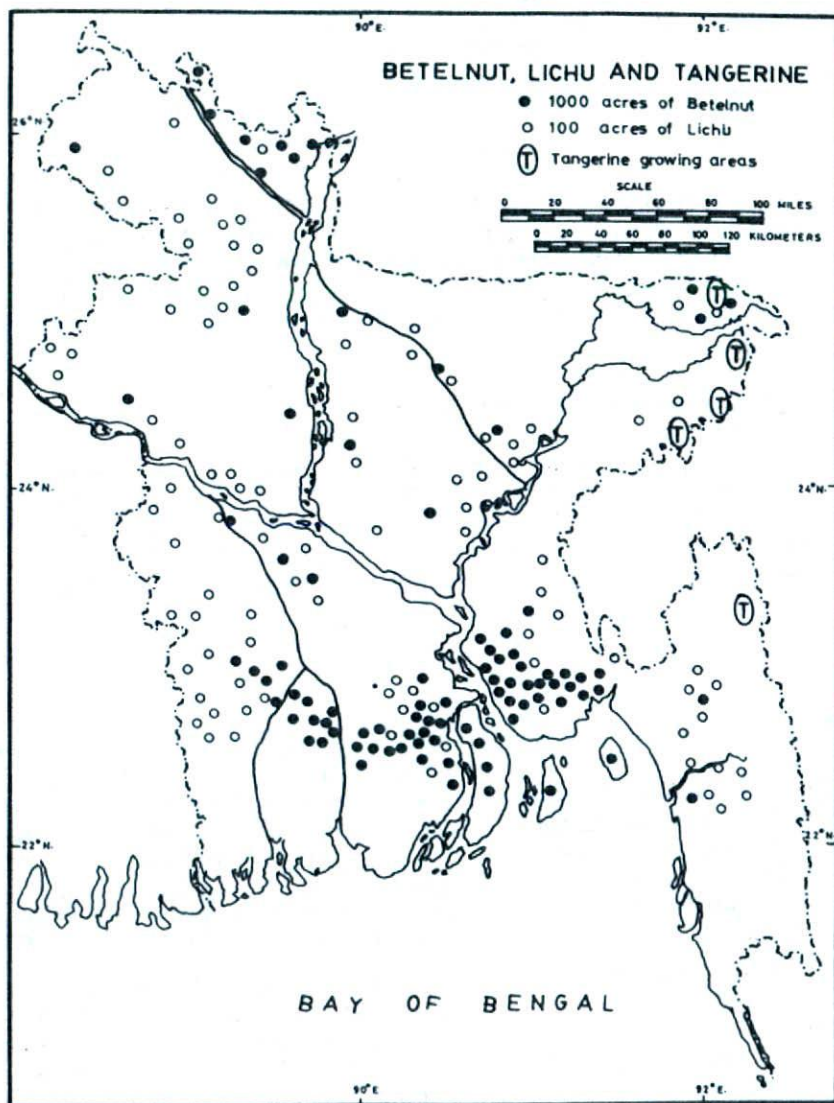
Patipata, a reed-like plant, is widely cultivated, because good mats are made from it. It is grown in clumps along the sides of the homesteads, and thrives under the marshy conditions along the ditches ringing them. Its cultivation is to some measure concentrated in Tangail, Narail, Jessore, Barisal, Feni, Noakhali, Habiganj, Moulvi Bazar and Sylhet districts.

Shupari or Betelnut

The Betelnut or Areca-nut palm (*Areca catechu*) is commercially the most important palm grown in Bangladesh. It is a slender tree, growing 9 to 12 metre high, with a small crown of feather-leaves. Its important product is the nut (Shupari), used as a masticatory all over South-East Asia. This palm is grown in enormous numbers in some of the seaward districts. Even the knowledge that 1,000 of these palm can be grown on an acre, can scarcely restrain one's astonishment that an estimated 110 million of them are cultivated in Bangladesh.

When a garden is made, ditches are dug around the boundary, and the earth is spread over the field to make it even and raise it above flood level. Cuttings of Madar trees are planted at distances of about 3.5 metres (12 feet) and the land is thus left for three or four years, so that the Madar leaves may decay on the ground and enrich it. Meanwhile a nursery is prepared in a shady place, where in October and November, ripe nuts from mature trees are sown in parallel ridges a few centimetres apart. The seed nuts are slit slightly at the crown. The nursery is covered with straw or palm leaves till the seeds germinate in June or July of

Map 10.18



the following year. The saplings are transplanted a year or two after that in rows 1.8 metre apart. An average orchard has 1,200 trees per acre. They bear fruit from the eighth year, and for forty years, when they begin to decline and are replaced. The above method is followed in the major growing areas of the south. In other parts of Bangladesh, these palms are grown in mixed orchards.

Table 10.32

Betelnut

Area : in acres

Production : in tons.

| Greater District | 1972-81 Average | | 1987-88 | Production |
|------------------|-----------------|---------------|---------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 647 | 257 | 655 | 130 |
| Mymensingh* | 743 | 207 | 1010 | 365 |
| Tangail | 164 | 28 | 320 | 65 |
| Jamalpur | 478 | 125 | 740 | 255 |
| Kishoregonj | 1,490 | 228 | 1,105 | 240 |
| Faridpur | 2,055 | 446 | 2,290 | 560 |
| Chittagong | 3,408 | 990 | 2,260 | 745 |
| Hill Tracts | 78 | 15 | 300 | 60 |
| Noakhali | 19,191 | 3,877 | 21,745 | 4,425 |
| Comilla | 5,604 | 1,115 | 4,275 | 935 |
| Sylhet | 5,186 | 2,143 | 3,025 | 935 |
| Rajshahi | 142 | 57 | 145 | 55 |
| Dinajpur | 658 | 290 | 740 | 215 |
| Rangpur | 8,703 | 4,519 | 6,685 | 3,125 |
| Bogra | 148 | 30 | 250 | 65 |
| Pabna | 374 | 110 | 315 | 75 |
| Khulna | 13,019 | 2,888 | 11,320 | 2,620 |
| Barisal | 22,402 | 4,908 | 21,445 | 6,085 |
| Patuakhali | 2,554 | 420 | 3,450 | 710 |
| Jessore | 4,162 | 985 | 3,290 | 705 |
| Kustia | 170 | 27 | 250 | 45 |
| Total : | 91,376 | 23,665 | 85,615 | 22,425 |

Source: B.B.S., *Op. Cit.*

* Three years average

There are two types of Betelnut palms, Bangla and Deshi. The Bangla variety flowers in February and March and the fruits are ready for plucking from September to December. The Deshi variety flowers in August-September and the fruit is plucked from February to April. Most (95%) of the trees are of the Bangla variety. Its trunk is usually 7.6 to 10.2 cm. and the nuts are 25 mm in diameter. The Deshi type has a much thicker trunk, from 12.7 to 17.8 cm. in diameter, and the nuts are twice as big as that of the Bangladesh variety. This type is mainly grown in the north of the Northern Region.

The picking of the nut is usually done by professional pluckers. Big gardens are leased out to Beparis (traders). The system of counting the nuts in Barisal (which has almost half the acreage under these palms), is as follows :

| | | |
|-----------|---|---------|
| 10 nuts | - | 1 Gha |
| 20 Ghas | - | 1 Kuri |
| 5 Kuris | - | 1 Shota |
| 10 Shotas | - | 1 Hazar |

A Hazar of nuts ranges from 10 to 11 thousand and weighs roughly a hundred-weight. The price per Hazar varies with the season and the quality. The production per acre also varies considerably. In the best areas, such as Mehendiganj, Bhola and Raipur Upazilas the production is 10 Hazars per acre. In the other good areas such as Pirojpur, Swarupkati, and Ramganj Upazilas, it is 8 Hazars to an acre. In fairly good areas, such as Bhola, Patuakhali, Feni, Abhoynagar and Shondip Upazilas, it is 6 Hazars per acre. In the poor areas such as Faridpur, Galachipa, Amtali, Kaliganj (R) and Kapasia Upazilas the yield is down to 4 Hazars per acre. The yield of nuts per tree varies from one hundred to four hundred.

The main enemies of these slender palms are wind and the Rhinoceros Beetle (*Oryctes rhinoceros*). Very strong wind blows down the nuts and may even break the top of the trees. The Rhinoceros Beetle is a scourge to all palms. It bores into the trunk and feeds on the tender 'Heart' leaves. If it bites through the central leaf, the tree dies. The only safe way of removing it is by hand, which, it can be judged, is a very laborious process. Recently an unidentified disease is killing off large numbers of old palms but has not affected new plantings.

In the main areas of production (Jessore, Khulna, Barisal, Noakhali and Comilla) the nuts are prepared in one of five different ways. The commonest form is Tari which is made by keeping the nuts in husk in a heap for a week to make them ferment a bit, and then drying them

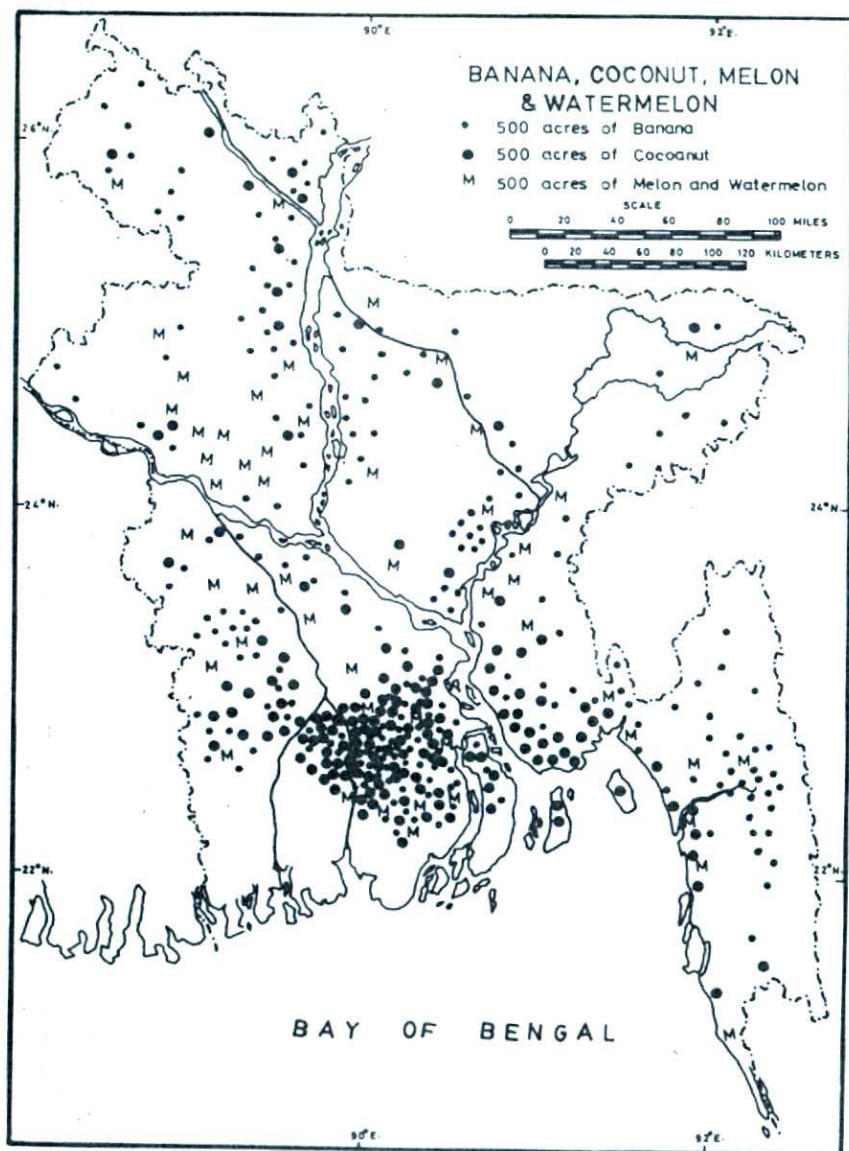
in the sun for 45 to 60 days till the husk completely separates from the nut. In Pirojpur and Jhalakati, the fruits are immersed in water for 48 hours before being shelled. This is the form in which most Bengalis chew it. Half the production of Khulna and Jessore is made into the Hansa quality, which is made by spreading the bigger fruits on mats in the sun for two months, regularly turning them over to give them uniform heat. When husked they give white coloured nuts of a mild taste. Maja nuts are ripe nuts which are steeped in water, which is occasionally changed. This softens them, and is thus preferred by those who want something softer than Tari. Janga, Latta, Dhagi or Khari nuts are prepared by steeping partially ripe nuts in water for two days, then washing them in cane baskets, also trampling with the feet (to get rid of the sap), and then sunning them once. This type is preferred by the Arakanese. Alwa, Jheel or Maghani nuts are prepared in the same manner, except that the nuts are not steeped. This type is liked by the Burmese and the Khasias.

The Betelnut, besides being a masticatory (along with the betel-leaf) can also be used in manufacture of vermifuge, dentifrices and gums. A by-product of the plant is the inner layer of the leaf sheath, known as Khui. It is used as a cigar wrapper in Burma. The dry leaves are burnt as fuel and the old trees are cut down for use as house posts or as part of Shako bridges. The husks are burnt and mixed with Gab juice to make a gum, with which the hulls of boats are caulked.

The main area of production is a belt stretching from Bagherhat, Kachua and Morrelganj in the west, through Pirojpur, Bakerganj, Bhola, Daulatkhan, Mehendiganj to Chandpur in the north and Begumganj in the east. The Meghna was diluvated many large gardens in Hijla, Mehendiganj, Daulatkhan and Faridganj Upazilas in the last twenty years. In the 1960s many large gardens were diluvated by the Lower Meghna in Faridganj, Chandpur, Lakkhipur and Raipura Upazilas. The only compensation is that Chars forming in the south and west will also form good betelnut gardens, in time.

The secondary area of production closely follows the main area in the south and has an interesting outlier in the betelnut growing areas of Rangpur and Dinajpur districts, right in the north. This latter area is actually part of a sub-montane belt which runs from Assam in the east to Nepal in the west. The production doubled in the period 1944-1961, but then it fell due to the decimation of orchards by a virus disease. Acreage in Bakerganj and Patuakhali districts is said to have fallen from 101,700 acres in the period 1960-65 to 24,000 acres in 1980. However area has picked up again and is estimated to be 185,000 acres (72,600 ha) at present.

Map 10. 19



COCONUT (Narkel)

The coconut palm (*Cocos nucifera*) is not grown as extensively as it deserves to be. This is a far more useful palm than betelnut and large areas in Bangladesh are suitable for its growth, but its cultivation is surprisingly sparse. One of the reasons is that coconut-oils is not used as a cooking-medium, as in South India. Another may be that since

Table 10.33

| Greater District | Coconut | | Area : in acres Production : in tons. | |
|------------------|-----------------|-----------------------|--|---------------|
| | 1972-82 Area | Average Production | 1987-88 Area | Production |
| Dhaka | 686 | 730 | 890 | 1,030 |
| Mymensingh* | 232 | 191 | 385 | 315 |
| Tangail | 233 | 83 | 450 | 235 |
| Jamalpur* | 135 | 126 | 195 | 200 |
| Kishoregonj | 489 | 550 | 720 | 665 |
| Faridpur | 4,854 | 5,074 | 5,640 | 6,060 |
| Chittagong | 3,466 | 2,078 | 3,500 | 2,415 |
| Hill Tracts | 399 | 260 | 445 | 420 |
| Noakhali | 6,823 | 7,089 | 10,015 | 11,080 |
| Comilla | 2,249 | 1,961 | 2,680 | 2,960 |
| Sylhet | 643 | 648 | 685 | 610 |
| Rajshahi | 1,762 | 1,670 | 1,125 | 1,010 |
| Dinajpur | 286 | 213 | 355 | 265 |
| Rangpur | 1,388 | 1,744 | 2,880 | 1,730 |
| Bogra | 207 | 241 | 410 | 390 |
| Pabna | 539 | 470 | 690 | 685 |
| Khulna | 12,548 | 15,390 | 12,560 | 18,845 |
| Barisal | 21,116 | 17,546 | 26,050 | 24,190 |
| Patuakhali | 3,469 | 1,868 | 4,730 | 3,030 |
| Jessore | 4,268 | 6,017 | 4,380 | 7,805 |
| Kushtia | 1,242 | 1,658 | 1,115 | 2,120 |
| Total : | 67,034 | 65,607 | 79,900 | 86,060 |

Source: B.B.S., *Op. Cit.*

* Five years average

no export trade in this commodity was developed, the farmers felt no incentive to grow it more intensively. Nevertheless there are an estimated 17 million coconut palms but yields are very low. There are six varieties coconuts, the common, Binni, Dhatu, Dudhia, Sammani Raktia, and Sammani Dudhia. When immature, the common variety is light green in colour, the Binni is orange-red, the Sammani Raktia is crimson and the Sammani Dudhia is whitish. The Dhatu, an edible-husked variety, has a sweet husk when immature and Dudhia has a very soft kernel, which can mix with milk and curdle it.

This palm is mostly grown amongst fruit trees or around tanks, betelnut gardens or homesteads. Where grown in gardens (e.g., Jhalakati, Swarupkati and Pirojpur Upazilas) the method of preparation is as follows : A trench is dug around the field and parallel trenches are dug inside about five metres (16 feet) apart, 0.6 to 0.9 metre (two or three feet) in depth and 1.2 to 1.8 metres (4 to 6 feet) in breadth. Saplings are usually bought from Beparis who rear them on a large scale. The saplings sprout from nuts which are half embedded in the soil, in an open yard. The nuts are usually put out in April and sprout in June. The age of the saplings sold varies from ten to twelve months. In most areas plantains or Madar cuttings are grown on the ridges to protect the shoots from the sun and also to enrich the soil with their fallen leaves. When planted on the ridges, the saplings are placed 6 metre apart (80 to an acre), in holes, wherein a small quantity of salt is usually placed. The saplings are tied to the Madar cuttings till they are about a metre (three feet) in height, when the Madar is cut down, and earth from tanks or ditches is spread round the base of the tree as manure. In south Jessore, Khulna and west Barisal, cowdung manure is applied once a year. Coconut thrives best on the Joba soil at the edge of the Bils, because of the high organic content in it. Those near homesteads, bear more than those in big gardens : the poorest crop is from those in or besides rice fields. The tree bears from sixth year on the best soils and the eighth year on those of fair quality. Flowers usually appear in April and November, and the nuts are ready in six month. Most trees, however, bear throughout the year with the main harvesting season from May to September. In the Bil areas of Swarupkathi and Banaripara, the average yield is about 50 nuts per tree. Its production drops as one goes further away from the main areas of production to 30 nuts per tree in Feni and Naria and 20 nuts or less in the far northern Upazilas. The average yield per acre is 1,500 nuts. The trees bear well for thirty years, when production declines. The main enemies of this palm are termites (especially for saplings), the Rhinoceros Beetle, and the insect *Rhynchophorus ferruginus*.

The main products of the coconut palm are Copra, coconut, coir, shells, dried leaves and timber. The kernel of the nut (Copra) is often used in culinary preparations, especially in sweetmeats. Coconut-oil, pressed from Copra, is used mainly as hair-oil. Coir (the fibre of the husk) is made into rope or mattress stuffing. Dried husks are also used as fuel. From the dried shells, Hookah pipes, ladles and lamps are fashioned. In the last few years, ash-trays and masks for wall decoration are being made from them. Dried leaves are used as fuel, and the timber from old trees is used to make doorsills or beams for thatched huts.

The main and secondary areas of production closely parallel that of the Betelnut palm, except that there is no secondary belt in Rangpur and Dinajpur districts ; but an interesting isolated pocket in Puthia and Paba Upazilas of Rajshahi (Map 10.19).

BANANA (Musa sapientum & M. paradisiaca) Kola

Banana is the most abundant of all fruits grown in Bangladesh. In many parts of the country, where the winters are mild, the summers warm and damp, with not much breeze, and the soil is enriched by river silt and organic fertilizers, bananas are grown under ideal conditions.

The average yield per acre has been taken to range from 14 to 16 tons; this seems to be too high. In well-managed farms, these yields can no doubt be obtained (and several gardens around Dhaka do obtain them), but most of the bananas are grown in scattered clumps, beside the homesteads or along the Ails of the fields. Moreover, places where there are large areas under bananas, do not necessarily produce much; in Rangpur district, where the banana acreage is high, bananas are none to plentiful. Ten tons per acre is a safe guess, though even that amount too might be on the higher side.

Banana suckers are planted in the rainy season. Fruits are marketed throughout the year, since varieties differ in their maturing period, but the crop is larger in the rainy season. Certain areas specialise in the variety they cultivate. Cox's Bazar district and Gaffargaon Upazila grow very good Chini Champa bananas which are small and sweet. Abhoynagar-Dumuria, Khoksha-Pangsha, Chandpur, Gaffargaon, Narsingdi, and Brahmanbaria Upazilas grow good Safri (Shobri) bananas, the most common of all varieties. It is a thick fruit with thin skin which bursts when it's ripe. The main banana growing area is, however, Munshiganj and Narayanganj districts. This belt of land stretches from Savar in a semi-circle through Munshiganj and Srinagar to Rupganj and Narsingdi. Here a variety of bananas are grown to perfection. The gardens are raised above flood level with earth dug

in winter from the edges and bottoms of the many rivers and streams. In a new laid garden brinjal is often inter-cropped. The banana leaf and fruit beetle (*Nodostoma viridipennis*) is the major pest for this fruit. The main varieties grown here are Amritshagor, Agnishwor, Kanai, Basi, Bangla, Nepali, Dudhshagor, Chini Champa, Martaban, Safri and Kobri. The great popularity of the large scented

Table 10.34

Banana

Area : in acres
Production : '000 tons.

| Greater District | 1972-82 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 5 | 4 | 5 | 34 |
| Mymensingh* | 2 | 14 | 2 | 13 |
| Tangail | 4 | 19 | 4 | 23 |
| Jamalpur* | 2 | 11 | 2 | 11 |
| Kishoregonj | 1 | 6 | 1 | 6 |
| Faridpur | 4 | 26 | 5 | 34 |
| Chittagong | 5 | 35 | 4 | 29 |
| Hill Tracts | 10 | 82 | 13 | 127 |
| Noakhali | 4 | 22 | 5 | 27 |
| Comilla | 2 | 12 | 3 | 15 |
| Sylhet | 6 | 37 | 3 | 14 |
| Rajshahi | 4 | 29 | 3 | 17 |
| Dinajpur | 4 | 22 | 4 | 22 |
| Rangpur | 6 | 36 | 6 | 35 |
| Bogra | 3 | 11 | 3 | 17 |
| Pabna | 5 | 32 | 3 | 16 |
| Khulna | 6 | 36 | 7 | 39 |
| Barisal | 11 | 71 | 18 | 125 |
| Patuakhali | 4 | 21 | 6 | 37 |
| Jessore | 4 | 23 | 4 | 26 |
| Kushtia | 2 | 11 | 2 | 13 |
| Total : | 94 | 560 | 101 | 684 |

Source: B.B.S., *Op. Cit.*

* Four years average

Amritshagor variety has led to excessive specialization in it, to the detriment of all other varieties, most of which are not very readily available. Excellent Amritshagor bananas are also grown in Matlab Bazar and Barisal Upazilas. The Safri type known as Malbhog is extensively grown in the Northern Region. Other varieties grown are : Kulapati (Large), Dingamanik (green when ripe), Madhubash, Tulapai, Jabkadli, Gopi, Gerashundor, Baista, Ghi-athia or Be-danaya-athia and Bhim-athia (seeded). Four varieties, viz. Amritshagor, Shobri, Chini Champa and Bangla, probably account for 75% of the production. The Nepali or Singapuri banana (*M. cavendishii*) is the dwarf China variety and is uncommon.

Plantain (Kanch Kawla) is also grown extensively. They are slightly different botanically, being *M. paradisiaca*, from the banana. The fruit looks the same, but remains green even when ripe, and is usually larger. It cannot be eaten raw; as a cooked vegetable it is popular. The figures for banana yield presumably also includes plantains. The main varieties are Anaji, Bhedardog and Choal-poush.

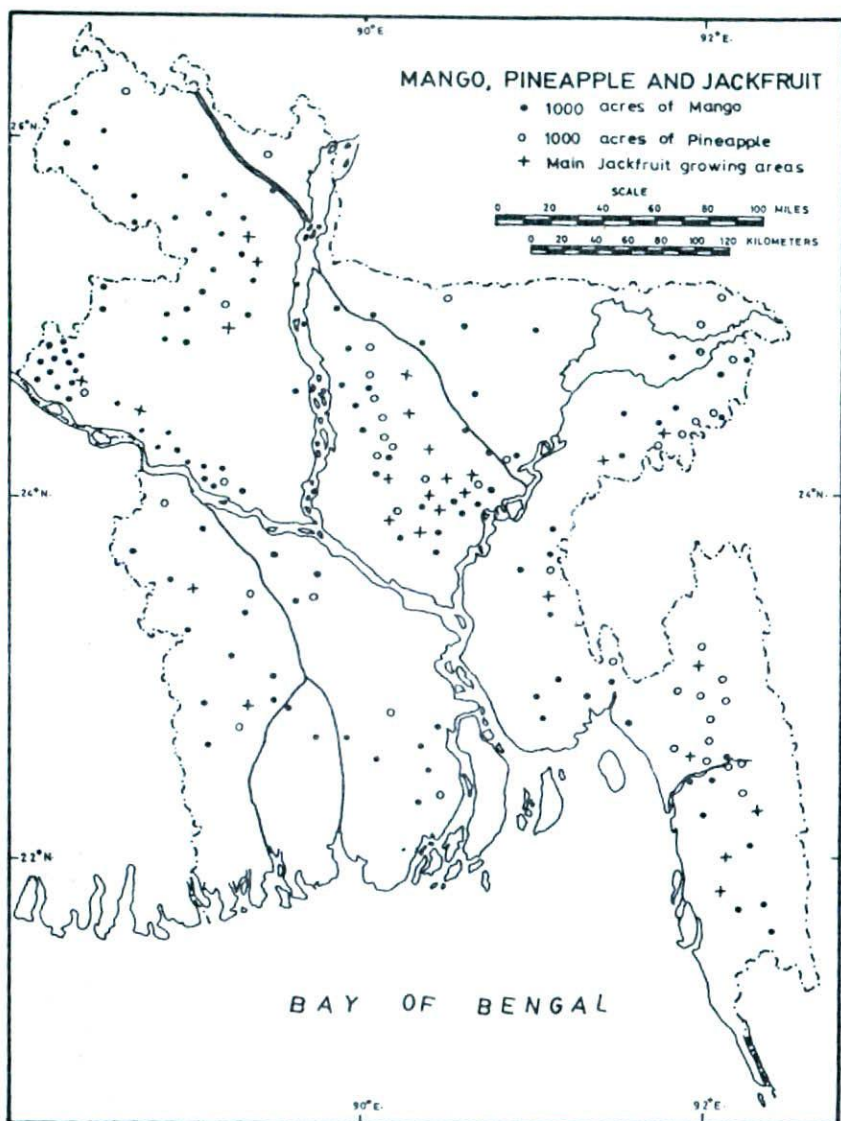
The flower of the banana is relished as a vegetable. Banana leaves are the 'poor-man's platters': many eat off small squares of these leaves : sweetmeats and butter are sold wrapped in them. Dried leaves are hung up to make 'curtains' around the poorer homesteads. The thick watery stalks are used for fodder. A wild banana (*M. ornata*) is plentiful in the forests of the Chittagong Region. Its fruit is much favoured by monkeys and elephants. Elephants, of course, relish all species of banana and not infrequently raid the clumps grown around the hill villages.

MANGO (*Mangifera indica*) Aam

Of all tropical fruits, the mango is probably the best. The quality, however, differs greatly according to the variety and the soil in which it has grown. There is quite a lot of truth in the saying that a bad mango is the worst, and a good mango the best, of all fruits.

Mango trees are among the commonest trees grown around the homesteads almost throughout Bangladesh. But very large number of them, in the eastern parts, are unproductive. There are regular mango orchards only in the Northern Region, the north-western part of the Southern Region and in parts of the Central Region. Mango grows best on light sandy loams. When an orchard is laid out, the ground is drained, ploughed up and fenced. Small plants which have been raised by Guti (Gootie) or grafting are transplanted in July and spaced at nine metre (ten yard) intervals. The first few years pulses are inter-cropped.

Map 10. 20



From the sixth year the trees bear fruit regularly. It is the usual practice that when the blossoms appear, the orchards are leased out to traders who look after them. Wind-falls can, however, by common custom be picked up by any one, and often are a source of income to the very poor. When nearly ripe, the fruits are plucked by bamboo poles which have purse-nets attached to them. The best orchards are west of Pabna town along the Ganges levee and the Mahananda flood-plain. The main varieties there are : Gopalbhog, Brindaban, Kumapahari, Lengra, Khirshapati, Kisshenbhog and Fazli. They appear on the market in that order, since the period in which they mature differs. The season lasts three months, from late May to late August. Very good mangoes are also grown around Dinajpur town, and in Jhenidah, Chuadanga and Meherpur districts. In the former area, the main varieties are : Gopalbhog, Misribhog, Chhadabora, Bhaduri and Shurajpuri and in the latter Lengra and Gopalbhog. It is a well known fact that mangoes grown west of semi-circle line from Satkhira to Thakurgaon, passing through Rupdia, Pangsha, Bogra and Rangpur are rarely affected by worms (*Cryptorhynchus mangiferae*) while those grown to the east of it are very liable to them. Obviously heavy rain in May is injurious to the crop.

There seems to be a cyclic rhythm to the amount of the mango crop. The cycle is of four years, with the crops : very good-poor-good-poor, in that order. A good crop is usually double that of a poor one, and half that of a very good one. Thus the cycle can be expressed as being 4 - 1 - 2 - 1 in nature.

The area under mango was about 130,000 acres (52,611 hectare) in 1950-51 and it seems to have reduced drastically in the following decades. In 1980-81 the area under mango was said to be only about 108,000 acres (43,708 hectare), but the BBS Farm Forestry Survey showed that total area under mango may be as much as 154,000 acres (61,000 ha). There has been widespread and indiscriminate elimination of gardens, especially in Jessore and Rajshahi districts. Nearly half of the trees are more or less unproductive.

The fruit is eaten in a number of different ways. A certain amount of the unripe fruit is pickled or eaten in curries. A fair amount is made into sweetmeats known as Amsatta and Amchur. Amsatta is made by extracting the juice and drying it in the sun on bamboo mats till it thickens into a jelly. Layers of this jelly are pressed together into slabs. The main areas of mango production are the following Upazilas : Satkhira, Tala, Kalaroa, Jhikargachha, Jessore, Bagerpara, Manirampur, Maheshpur, Sailkopa, Jhenidah, Kaliganj, Kotchandpur, Salikha, Magura, Sripur, Kushtia, Kumarkhali, Khoksha, Mirpur, Bheramara, Daulatpur, Chuadanga, Jibannagar, Damurhuda, Alamdanga, Meherpur,

Table 10.35

| Greater District | Mango | | Area : in acres Production : in tons. | |
|------------------|---------|------------|--|------------|
| | 1972-82 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 5 | 13 | 8 | 13 |
| Mymensingh* | 2 | 6 | 3 | 5 |
| Tangail | 5 | 7 | 6 | 6 |
| Jamalpur* | 3 | 8 | 3 | 8 |
| Kishoregonj | 2 | 7 | 3 | 4 |
| Faridpur | 3 | 3 | 3 | 1 |
| Chittagong | 5 | 18 | 5 | 19 |
| Hill Tracts | 2 | 2 | 4 | 3 |
| Noakhali | 3 | 5 | 4 | 3 |
| Comilla | 3 | 6 | 4 | 4 |
| Sylhet | 5 | 16 | 9 | 12 |
| Rajshahi | 24 | 57 | 24 | 17 |
| Dinajpur | 9 | 15 | 9 | 9 |
| Rangpur | 8 | 28 | 8 | 13 |
| Bogra | 3 | 9 | 4 | 7 |
| Pabna | 4 | 13 | 5 | 7 |
| Khulna | 3 | 7 | 4 | 6 |
| Barisal | 6 | 16 | 5 | 11 |
| Patuakhali | 1 | 1 | 1 | 1 |
| Jessore | 6 | 5 | 5 | 6 |
| Kushtia | 4 | 6 | 3 | 5 |
| Total : | 106 | 248 | 120 | 160 |

Source: B.B.S., *Op. Cit.*

* Four years average

Gangni, Pangsha, Natore, Lalpur, Baraigram, Bagmara, Puthia, Charghat, Paba, Durgapur, Bholahat, Shibganj, Nawabganj, Porsha, Gomastapur, Pabna, Ishurdi, Dinajpur, Tejaon and Raipura (Map 10.20). In these areas, the crop is very important commercially both because of the quantity and the season it becomes marketable. The mango harvest

tides the poorer farmers over the difficult period just before the Aus crop is in, since by then the supply of Aman rice in the market is usually very low. In the areas of really large production, such as Shibganj, Paba and Charghat Upazilas, mangoes are practically the staple food for two months. In the other important areas of production, they are a very important supplement to the diet. Moreover, it is a cash crop wherever it is grown extensively, and in Maheshpur, Kaliganj, Kotchandpur, Bheramara, Tanor, Ishurdi, Bholahat, Shibganj, Nawabganj, Nachole, Gomastapur, and Pursha Upazilas it is the main cash crop, being more important than even jute. In a larger number of Upazilas in the main areas of production, it ranks next to jute as a cash crop. The importance of this crop to the economic well-being of forty-six Upazilas, covering an area of 15540 sq. hm. (6,000 square miles), is generally not realised.

JACK-FRUIT (*Artocarpus heterophyllus*) Kathal

Jack-fruit is second only to rice as a food in many parts of Bangladesh. In the Madhupur Tract, parts of the Eastern Barind, the edges of the Haor Basin, parts of the Meghna flood-plain and of the Moribund Delta, this fruit is almost the staple food for nearly two months (June and July) of the year (between the Boro and Aus harvests). For many of the poor, it is a substitute for rice during that period. In appearance the fruit is most unprepossessing. It grows not only on the branches but on the trunk too, and the large ones are about a metre (over a yard) long and more than 30kg. (70 lbs) in weight. These large fruits often grow in abundance, which is most fortunate for the poor who depend on it. The flesh is eaten when ripe and the seeds are cooked in curry. Two types of fruits are recognised: one with firm and the other with soft flesh. When grown in orchards, there are about thirty trees per acre. The area under Jack fruit is estimated, by the Directorate of Agriculture, to be 48,000 acres (18,900 ha) and the production of fruit at 198,000 tons. The 1988 BBS Survey cited early estimated the area at 92,700 acres (36,500 ha) and production at 2.37 million tons. It is most abundant in the south-east of the Madhupur Tract (Raipur, Joydebpur, Tejgaon and Savar Upazilas).

GUAVA (*Psidium guayava*) Peara

This is widely grown fruit of South American origin. It is grown everywhere, but is most common around Nawabganj, Faridpur, Dhaka Swarup Kati and Kanchannagar. There are two varieties, one of them round and the other pearshaped. Guava jelly is being processed in several factories.

PINEAPPLE (*Ananas sativa*) *Ana-rosh*

This South American fruit has become naturalised. It is cultivated in all but water-logged areas. The main areas of production are east and south Sylhet district, Susang Hills Region, a belt between Narsingdi and Joydebpur, northern Rangpur district, a belt between Jessore and Khulna, between Rajshahi and Pabna, the sub-montane strip from Kasba as far south as Teknaf, and the Matamori Valley. It has been

Table 10.36

| Greater District | Pineapple | | Area | Production |
|------------------|---------------|----------------|---------------|----------------|
| | Area | Production | Area | Production |
| Dhaka | 2,697 | 8,671 | 2,690 | 8,535 |
| Mymensingh* | 386 | 673 | 885 | 1,875 |
| Tangail | 1,395 | 5,886 | 5,835 | 34,625 |
| Jamalpur* | 199 | 350 | 300 | 710 |
| Kishoregonj | 225 | 447 | 145 | 450 |
| Faridpur | 115 | 168 | 110 | 170 |
| Chittagong | 2,033 | 10,285 | 1,675 | 9,275 |
| Hill Tracts | 10,620 | 32,145 | 9,985 | 35,510 |
| Noakhali | 458 | 1,255 | 360 | 1,020 |
| Comilla | 263 | 1,179 | 335 | 1,295 |
| Sylhet | 11,987 | 64,758 | 8,145 | 45,250 |
| Rajshahi | 352 | 620 | 225 | 385 |
| Dinajpur | 619 | 1,414 | 435 | 940 |
| Rangpur | 816 | 1,389 | 735 | 1,415 |
| Bogra | 145 | 301 | 185 | 390 |
| Pabna | 149 | 299 | 105 | 285 |
| Khulna | 392 | 898 | 445 | 1,040 |
| Barisal | 817 | 1,237 | 460 | 1,005 |
| Patuakhali | 140 | 212 | 190 | 290 |
| Jessore | 301 | 820 | 360 | 1,040 |
| Kushtia | 18 | 35 | 5 | 10 |
| Total : | 34,127 | 133,015 | 33,790 | 145,455 |

Source: B.B.S., *Op. Cit.*

* Four years average

grown successfully in the Central Delta Basin and the Matamori Delta (Ilishia). In south Sylhet (Srimangal, Kamalganj Upazilas) and the Matamori Valley, the predominant variety is the greenish-yellow Giant Kew of the Cayenne group. The usual weight of the fruit is 1.3 to 2.3 kg ; in the Matamori Valley fruits of more than 4.5 kg. weight are not uncommon, and a few 9 kg weight fruits have been grown at Alikadam. They also do very well at Jaintiapur. The yield per acre of this variety ranges from 9 to 15 tons. In the Narsingdi - Joydebpur area the predominant variety is the reddish Chorashal of the Spanish group. It is usually between 1.3 and 1.8 kg. in weight. The yield per acre ranges from 7 to 10 tons. The fruit tastes rather watery and is losing flavour. In all areas except those mentioned above, the yellow coloured Honey Queen of the Queen group is the predominant variety of pineapple. It has a small fruit usually 0.9 to 1.3 kg. in weight ; per acre yield ranges from 7 to 9 tons. The best fruits of this variety are said to be from Chauddagram Upazila and are known after Comilla when marketed. The once famous Jaldhup pineapples from Beanibazar and Barlekha Upazilas of eastern Sylhet district are of this variety ; at present the gardens are not well tended and the quality has deteriorated.

CUSTARD-APPLE (*Anona reticulata*) Aa-taa

Another introduction from South America, this too has become naturalised and is often found growing semi-wild. It is common in Rangpur and Dhaka districts and is available in most other places. The closely related Bullock-Heart or Ata (*Annona squamosa*) is plentiful in the Northern and Central Regions and parts of the Eastern Region (e.g., Moishkhali Island).

LITCHU (*Nephelium litchi*) Lichu

This delicious fruit is grown only in selected localities, being partial to rich, well-drained soils. Its extensive cultivation is limited to Kishoreganj-Gaffargaon area, north Rangpur district, south Dinajpur district and on good soils west of a line drawn from Charchat to Rohangpur. It is plentiful around Chapai Nawabganj. Varieties grown are Muzaffarpuri, Bombai, Kashba, Purabi and Deshi. The last name is the most common. Muzaffarpuri and Bombai are the best varieties, with thick sweet flesh and fairly small seed. Two varieties, China No.1 and No.3, have proved very successful and are being propagated by the Agriculture Ministry. The Litchi mite, *Aceria litchi* is the major pest for this fruit.

Table 10.37

Litchi

Area : in acres
Production : in tons.

| Greater District | 1972-82 Average | | 1987-88 | |
|------------------|-----------------|---------------|--------------|---------------|
| | Area | Production | Area | Production |
| Dhaka | 347 | 750 | 460 | 700 |
| Mymensingh* | 198 | 384 | 285 | 400 |
| Tangail | 99 | 197 | 225 | 225 |
| Jamalpur* | 151 | 297 | 210 | 285 |
| Kishoregonj | 262 | 499 | 400 | 430 |
| Faridpur | 390 | 445 | 430 | 230 |
| Chittagong | 446 | 713 | 535 | 960 |
| Hill Tracts | 199 | 129 | 560 | 420 |
| Noakhali | 88 | 104 | 175 | 140 |
| Comilla | 90 | 114 | 165 | 100 |
| Sylhet | 182 | 339 | 425 | 440 |
| Rajshahi | 844 | 2,276 | 700 | 1,050 |
| Dinajpur | 545 | 673 | 630 | 460 |
| Rangpur | 683 | 1,368 | 850 | 685 |
| Bogra | 239 | 488 | 330 | 415 |
| Pabna | 327 | 909 | 360 | 450 |
| Khulna | 250 | 136 | 715 | 415 |
| Barisal | 422 | 284 | 670 | 465 |
| Patuakhali | 42 | 12 | 125 | 30 |
| Jessore | 456 | 826 | 830 | 1,270 |
| Kushtia | 395 | 506 | 375 | 520 |
| Total : | 6,655 | 11,449 | 9,455 | 10,120 |

Source: B.B.S., *Op. Cit.*

* Four years average

PAPAYA (*Carica pepo*) *Pae-pae*

Papaya is yet another South American fruit which has become naturalised. About 6,660 acres (about 2600 ha) are under its cultivation, from which the production is about 20,100 tons. The best are said to be grown

in Rajshahi and Sylhet districts. It is extensively grown in Jessore and Kushtia districts. The Alikadam variety of the Hill Tracts district bears very large fruits and grows to a height of 6 metre or more. Two-thirds of the fruits are eaten green as vegetables, and the rest is consumed as fruit when ripe.

Table 10.38

| Greater District | Papaya | | Area | Production |
|------------------|--------------|---------------|--------------|---------------|
| | 1976-81 | Average | 1987-88 | Production |
| | Area | Production | Area | Production |
| Dhaka | 346 | 2,135 | 700 | 2,875 |
| Mymensingh* | 190 | 589 | 240 | 770 |
| Tangail | 133 | 573 | 240 | 1,070 |
| Jamalpur* | 147 | 453 | 190 | 630 |
| Kishoregonj | 116 | 319 | 280 | 810 |
| Faridpur | 831 | 1,474 | 1,045 | 1,130 |
| Chittagong | 270 | 1,025 | 610 | 2,335 |
| Hill Tracts | 546 | 907 | 700 | 2,595 |
| Noakhali | 213 | 690 | 395 | 1,220 |
| Comilla | 223 | 351 | 310 | 1,145 |
| Sylhet | 197 | 1,087 | 400 | 1,470 |
| Rajshahi | 576 | 1,516 | 315 | 1,395 |
| Dinajpur | 256 | 323 | 310 | 430 |
| Rangpur | 638 | 1,460 | 535 | 1,535 |
| Bogra | 116 | 350 | 140 | 405 |
| Pabna | 484 | 2,717 | 345 | 1,745 |
| Khulna | 412 | 1,492 | 620 | 2,115 |
| Barisal | 175 | 387 | 350 | 1,030 |
| Patuakhali | 80 | 176 | 130 | 235 |
| Jessore | 486 | 1,684 | 870 | 4,200 |
| Kushtia | 220 | 383 | 285 | 515 |
| Total : | 6,655 | 20,091 | 9,010 | 29,655 |

Source: B.B.S., *Op. Cit.*

* Three years average

Table 10.39
Citrus Fruits

Area : in acres
Production : in tons.

| Greater District | 1972-81 Average | | 1987-88 Production | |
|------------------|-----------------|------------|--------------------|------------|
| | Area | Production | Area | Production |
| Dhaka | 270 | 249 | 285 | 295 |
| Mymensingh* | 405 | 384 | 225 | 205 |
| Tangail | 378 | 632 | 255 | 535 |
| Jamalpur* | 355 | 322 | 215 | 200 |
| Kishoregonj | 235 | 254 | 135 | 125 |
| Faridpur | 753 | 692 | 215 | 225 |
| Chittagong | 685 | 814 | 320 | 465 |
| Hill Tracts | 712 | 648 | 390 | 490 |
| Noakhali | 493 | 830 | 465 | 740 |
| Comilla | 181 | 264 | 150 | 245 |
| Sylhet | 4788 | 7892 | 450 | 750 |
| Rajshahi | 893 | 1643 | 390 | 595 |
| Dinajpur | 664 | 596 | 240 | 235 |
| Rangpur | 916 | 1065 | 595 | 820 |
| Bogra | 288 | 303 | 185 | 180 |
| Pabna | 364 | 455 | 405 | 730 |
| Khulna | 484 | 413 | 305 | 315 |
| Barisal | 214 | 285 | 190 | 225 |
| Patuakhali | 45 | 51 | 135 | 210 |
| Jessore | 338 | 255 | 225 | 245 |
| Kushtia | 466 | 508 | 75 | 125 |
| Total : | 13927 | 18555 | 5850 | 7955 |

Source: B.B.S., *Op. Cit.*

* Two years average

CITRUS FRUITS (Lae-bu)

The most common citrus fruit is the sour lime (*Citrus acida*) of which there are two varieties, Pati and Kagzi. It is most common around Rajshahi, Khulna, Jessore, Bakerganj, Rangpur, Dhaka, Comilla and Chittagong. Small orchards of this lime are cultivated in Khulna, Jessore,

Bakerganj and Chittagong districts. Its juice is commonly used in Sharbats. Pomelo or Batabi lebu (*C. decumana*) is another common citrus fruit especially in Sylhet, Jessore and Khulna districts. Its fruits best in the Madhupur Tract. Sharbati and Jamir are two varieties of sweet lime (*C. limetta*), which are fairly common in limited areas of Rangpur, Mymensingh, Dhaka, Barisal, Sylhet and Noakhali districts. Citron (*C. medica*) locally called Satkora, is grown in Sylhet and Hill Tracts districts. Tangerines (*C. aurantium*) commonly known as Komola (orange), are grown in a few areas. In the north-east of the Hill Tracts district (in the Sajek range), it is grown around the hill villages. In Sylhet district, it is grown in orchards in the Langla and Juri Valleys, near Beanibazar and Kulaura, and in the north of Gowainghat and Jaintiapur Upazilas. There are about 2,000 acres (787 ha) of tangerines in those places, but over half the acreage is unproductive. The annual crop is about 2,400 tons. Tangerines are reported to have also been grown quite successfully in Bhurungamari Upazila and at Aylla Phuljhuri in Barguna Upazila. Its cultivation is being tried near Cox's Bazar. Local production hardly meets a tenth of the demand and tangerines and oranges have to be imported from India (mostly from the Khasi and Jaintia hills).

Boroi (*Zizyphus jujube*)

A very common fruit. It comes in two varieties, Deshi and Narkeli. Grows best in Kachua upazila of Chandpur district and in Faridpur district, but is most abundant in the Piedmont Alluvial Plain and the small valleys in the Barind Tract.

BENGAL OLIVE (*Elaeocarpus serratus*) Aamloki

This fruit is popularly mistaken as the real olive. It is abundant towards the end of the rainy season. It is mostly pickled.

TROPICAL PERSIMMON (*Diospyros philippensis*) Gaab

Grows to perfection in many places and is fairly common in Noakhali and Chandpur districts. The closely related Deshi Gaab (*D. peregrina*) is used mainly for tanning nets. The Persimmon (*D. Kaki*), is known as Maghistani-gab, and is apparently also grown.

Table 10.40

| Greater District | Melon | | Area | Production |
|------------------|-----------------|------------|------------|------------|
| | Area | Production | Area | Production |
| | | | : in acres | : in tons. |
| | 1972-81 Average | | 1987-88 | Production |
| Dhaka | 1,332 | 8,393 | 1,160 | 6,980 |
| Mymensingh* | 65 | 233 | 180 | 635 |
| Tangail | 78 | 205 | 255 | 865 |
| Jamalpur* | 195 | 716 | 265 | 1,090 |
| Kishoregonj | 73 | 521 | 195 | 1,150 |
| Faridpur | 1,476 | 5,114 | 1,610 | 5,655 |
| Chittagong | 2,818 | 19,062 | 2,375 | 15,220 |
| Hill Tracts | 217 | 812 | 375 | 1,375 |
| Noakhali | 647 | 3,181 | 510 | 1,400 |
| Cornilla | 1,463 | 8,429 | 2,375 | 6,545 |
| Sylhet | 103 | 412 | 465 | 1,840 |
| Rajshahi | 2,029 | 12,837 | 2,915 | 17,520 |
| Dinajpur | 184 | 1,099 | 300 | 1,610 |
| Rangpur | 343 | 1,237 | 370 | 1,095 |
| Bogra | 1,557 | 9,075 | 850 | 4,435 |
| Pabna | 1,865 | 13,113 | 2,325 | 15,715 |
| Khulna | 474 | 3,065 | 475 | 1,665 |
| Barisal | 774 | 5,062 | 1,445 | 7,585 |
| Patuakhali | 1,003 | 5,226 | 1,800 | 7,160 |
| Jessore | 1,368 | 5,138 | 2,225 | 12,700 |
| Kushtia | 267 | 876 | 855 | 3,580 |
| Total : | 18,331 | 103,808 | 23,325 | 115,820 |

Source: B.B.S., *Op. Cit.*

* Three years average

MELON (*Phuti* or *Bange*) & WATERMELON (*Tormuj*)

Watermelons and several varieties of melons are extensively grown from March to May. They grow best on sandy soils and as such are cultivated mainly along the banks of the Ganges, Padma, Gorai-

Modhumati, Old Brahmaputra, Karnafuli, Sangu, Matamori and other rivers (Map 10.19). There are two main types of melons (*Cucumis melo*) known as Phuti and Bangi. The latter is a large ovoid fruit, which grows best on the sandy Chars at the confluence of the Ganges and the Jamuna (Goalundo, Bera, Shibaloy Upazilas). Watermelon (*Citrullus vulgaris*) or Tormuj grows very well in that area and also in the Karnafuli Valley (where the well-known Patenga variety is grown).

POMEGRANATE (*Punica granatum*) Bedana

Pomegranates are of two types : the large, soft, juicy Anar and the small, hard, seedy Dalim. It is the latter type that thrives in Bangladesh. It is fairly common in the Northern Region, and in the coastal areas of the Chittagong Sub-Region.

WATER-CHESTNUT (*Trapa bicornis*) Pani Phal

This strange fruit grows in many tanks and ditches and is not systematically cultivated. In the rainy season the fruits are collected and sold.

ROSE APPLE (*Eugenia javanensis* or *Syzygium Sanarangense*) Jamrool

The waxy-white pear-shaped Jamrool fruits are in season in May and June. A few trees are found in most localities.

Jaam (*Eugenia jambolana* or *Syzygium cumini*)

The Jaam is one of the most common trees. Its small purple fruits are in season in April and May. Though much cultivated, its fruit has little to recommend it, whereas its stain on clothings can be of a permanent nature.

STAR APPLE (*Averrhoa carambola*) Kam-ranga

The Kamranga is a curious, ovoid, deeply cleft fruit, borne in great profusion. It is in season in the rainy period.

Dep-hul (*Artocarpus lakoocha*)

This is very rare, except in Sylhet district. Its yellowish sweet acid fruits are marketed only in that district.

Amra (*Spondias mangifera*)

A native of the Pacific Islands, this is a common fruit tree over most of the wetter parts of Bangladesh. It is in season during the later part of the monsoons.

INDIAN ALMOND (*Terminalia catappa*) Ba-ddam

Another fruit tree, of which one or two only are usually found in a village. The fruits are generally only eaten by children, as it is slightly astringent. The one-seeded kernel is very much like an almond in taste and resemblance, and is, indeed, marketed as an inferior variety of almond. There are two crops, in December and in June.

SAPODILLA (*Achras sapota*) Sa-fedā

Firminger wrote in praise of this fruit: 'A more luscious, cool and agreeable fruit is not to be met with perhaps in any country in the world'. It is, however, not very popular in Bangladesh. The best and biggest of these are grown near Faridpur town. It is in season in March and April.

Aam-loki (*Phyllanthus emblica*)

The round, green, acid fruits of the size of marbles, are made into preserves. In season from November to February.

Hori-taki (*Amoora rohituka*)

The fruits are pickled. Oil from the seed is sometimes used for lighting.

BENGAL QUINCE (*Aegle marmelos*) Bael

This globular fruit, with a hard, woody, smooth green shell has a doughy, aromatic pulp. When not fully ripe, the fruit is astringent and has medical uses. The ripe fruit has a tonic and laxative effect. Cultivated quite widely because of the medicinal properties of the fruit, it is plentiful in the cultivated parts of the Madhupur Tract, and the Northern Region.

ROZELLE (*Hibiscus sabdariffa*)

The fleshy sepals of this plant remain after the flowers fall away and become enlarged and succulent, enclosing the fruit capsule. These sepals are made into a jam, or the fruit is pickled. The young leaves are sometimes used as vegetable.

CAPE GOOSEBERRY (*Physalis peruviana*) *Tippari*

The cherry like yellow fruit is popular where obtainable, but this plant is sparingly cultivated (again, mostly near Dhaka). Jam making from it is gaining popularity.

TAMARIND (*Tamarindus indicus*) *Tei-tul*

The brownish pods, containing a mass of sweetish acid brown pulp, are used largely in Chutneys (Pickle) and preserves, and also in medicine. The pulp is usually pressed in blocks when marketed. The tamarind is a common tree in south Central Region, north Northern Region and west Southern Region. Other fruits that deserve mention are Chalta (*Dillenia indica*), Saptalu, a type of Cherry (*Prunus indica*), and Betoon (*Calamus spp.*).