Distribution of Crops and Cropping Patterns in Bangladesh

M Nasim[1], S M Shahidullah[1]*, A Saha[1], M A Muttaleb[1], T L Aditya[2], M A Ali[2] and M S Kabir[3]

ABSTRACT

Agricultural land use and distribution of cultivated crops expressed in cropping pattern (CP) constitute the base for increasing produtivity. An in-depth study was conducted on the existing CPs of Bangladesh in each and every upazila (sub-districts) using semi structured questionnaire and data validation by the stakeholder consultation workshop conducted in each of 64 districts. Three hundred and sixteen CPs were identified throughout Bangladesh excluding the very minor ones. Topmost five CPs were only rice containing CPs, which covered 51% of the net cropped area. The most dominant CP was Boro-Fallow-T. Aman covering 27% of net cropped area. Results on major cropwise CPs, location-wise CPs, CP diversity and crop diversity etc are also presented herein.

Key words: Land use, cropping pattern, cropping intensity, crop diversity index

INTRODUCTION

Bangladesh, an agriculture dominating country, belongs to the greatest delta (Ganga-Brahmaputra and Sundarbans) of the world criss-crossed by thousands of rivers and revulets (Fig. 1). The land is enreached with fertile alluvial soil. The soil and environment is well suited for different kinds of crops all over the year. About 57% of its total land is arable (Anonymous, 2016a). The lion share of the total land has been brought under cultivation to satisfy the demand of teeming millions. Despite this achivement, a huge population has a limited access to enough land under their jurisdiction making agriculture a challenging option. On the other hand, the yearly transformation of a certain area (0.47%) of arable land from agriculture to non-agriculture use is a grave concern to agricultural community due to population pressure, urbanization and some non-agricultural purposes. Thus, getting more food from less land would be one of the most challenging concern for the country even having some improvement of the existing agricultural system. Despite the reduction of dependency on absolute agriculture, 45% of the total labour forces of the country and 16% of GDP have to rely directly on agriculture (Anonymous, 2016a). Beside the crop coverage, the agricultural land is occupied by forest, mangrove forest, river, lake, *bil*, *haor*, aquaculture, tea and salt pan (Hasan *et al*., 2013). Lots of crops are cultivated both of tropical and temperate origin in this country. Agricultural land use at a local level is expressed by the spatial and temporal distribution of crops often expressed as cropping pattern (CP). CP depends on the physiography, environment and socio-economic conditions of a particular area.

Physiography, ecosystem and environment

Agriculture is predominantly influenced by the varying environmental and physiographic conditions of an area. Three broad physiographic groups are marked in Bangladesh and they belong to three distinct geographical ages as, tertiary hills, pleistocene terraces and recent floodplains (Fig. 2). These physiographic groups are represented by hill soils in south-eastern and north-eastern areas, accounting for about 12% of the land, terrace soils consist

[1]Rice Farming Systems Division, BRRI, Gazipur; [2]Director, Bangladesh Rice Research Institute; [3]Director General, Bangladesh Rice Research Institute, Gazipur; *Corresponding author's E-mail: shahidullah4567@gmail.com
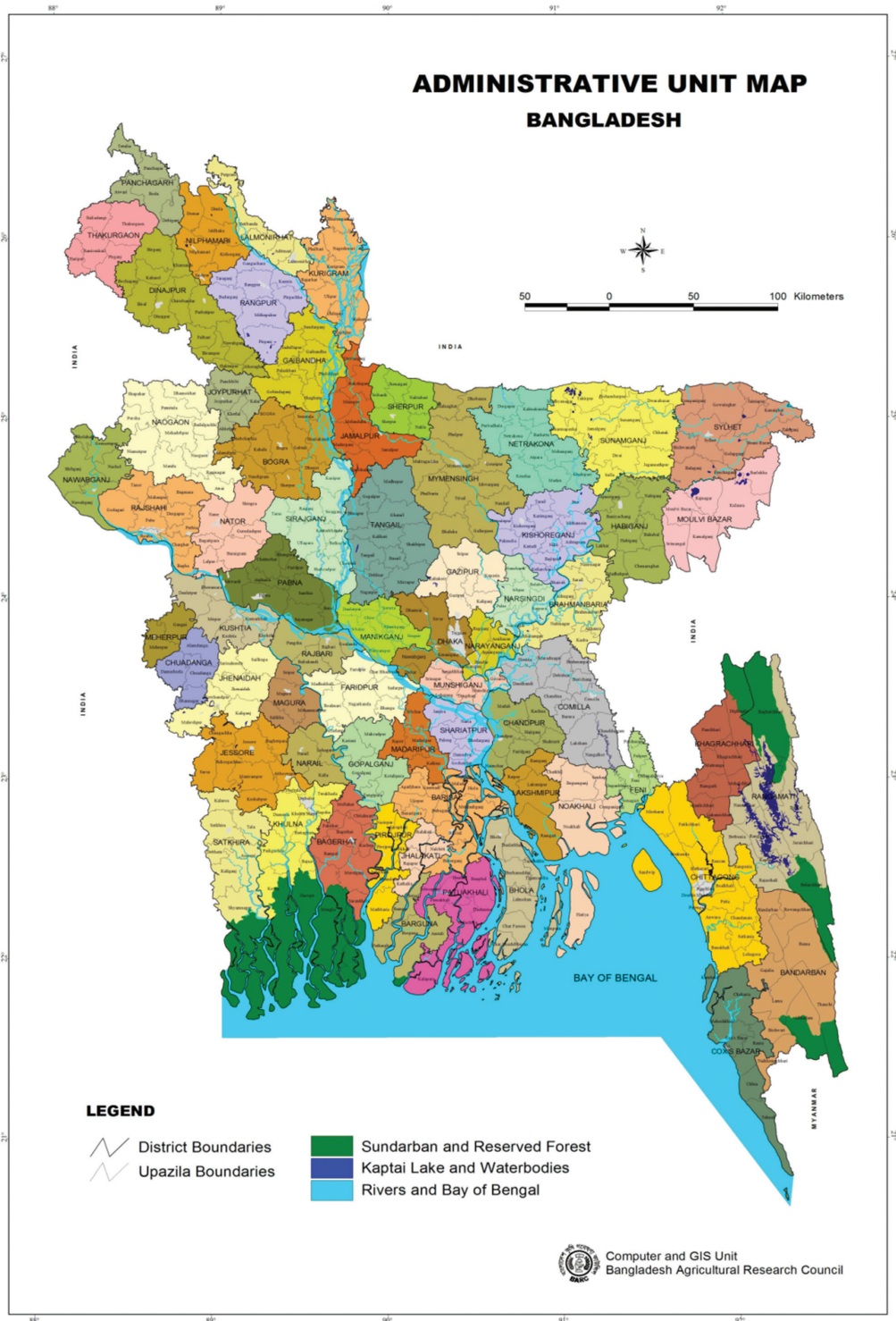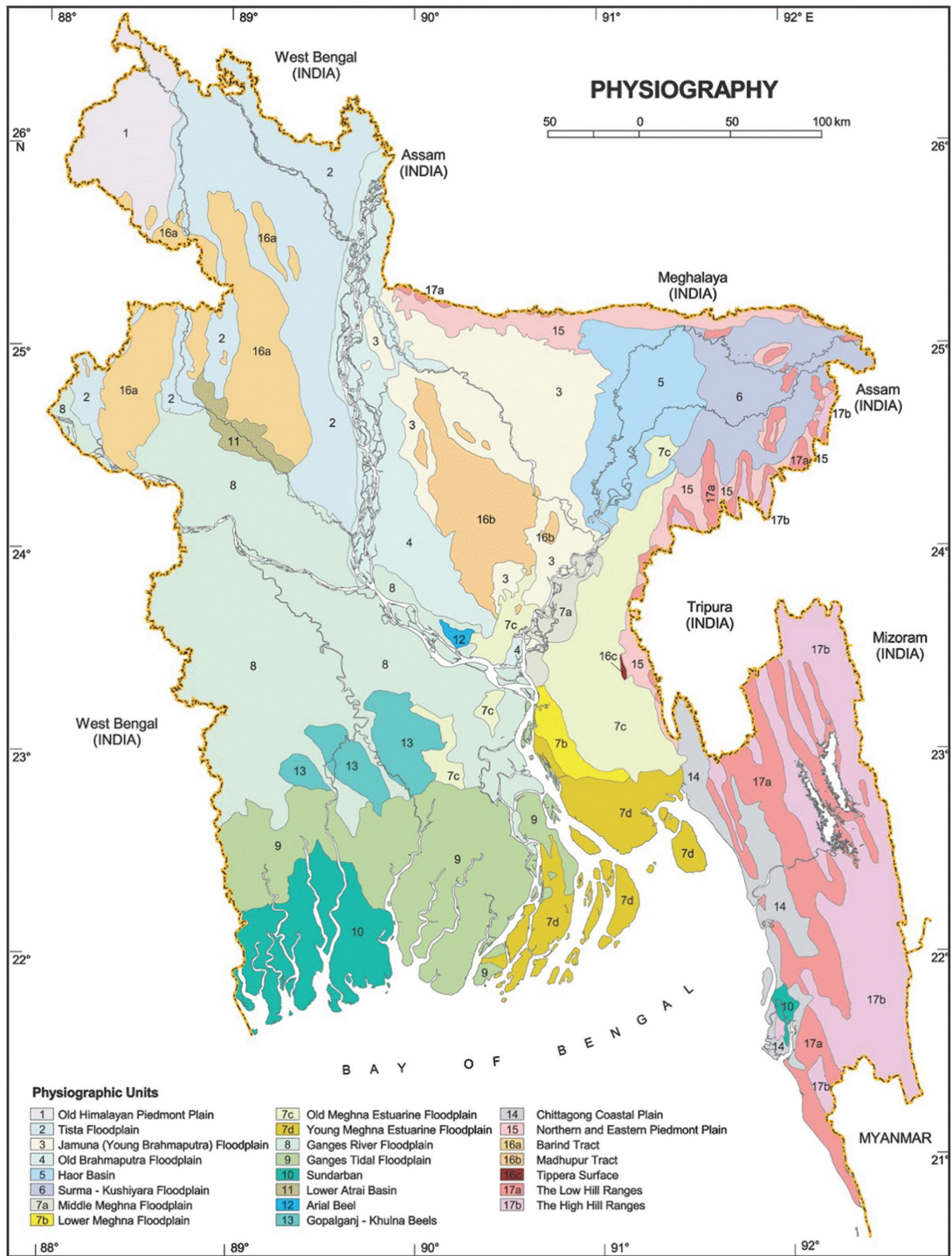
Fig. 1. Upazila-wise map of Bangladesh (http://maps.barcapps.gov.bd/index.php?t=administrative).

PHYSIOGRAPHY

West Bengal (INDIA)

Assam (INDIA)

Meghalaya (INDIA)

Assam (INDIA)

Tripura (INDIA)

Mizoram (INDIA)

West Bengal (INDIA)

MYANMAR

BAY OF BENGAL

Source: Modified From *SRDI, 1997; Rashid, 1991; Reimann, 1993*

Physiographic Units

1	Old Himalayan Piedmont Plain
2	Tista Floodplain
3	Jamuna (Young Brahmaputra) Floodplain
4	Old Brahmaputra Floodplain
5	Haor Basin
6	Surma - Kushiyara Floodplain
7a	Middle Meghna Floodplain
7b	Lower Meghna Floodplain
7c	Old Meghna Estuarine Floodplain
7d	Young Meghna Estuarine Floodplain
8	Ganges River Floodplain
9	Ganges Tidal Floodplain
10	Sundarban
11	Lower Atrai Basin
12	Arial Beel
13	Gopalganj - Khulna Beels
14	Chittagong Coastal Plain
15	Northern and Eastern Piedmont Plain
16a	Barind Tract
16b	Madhupur Tract
16c	Tippera Surface
17a	The Low Hill Ranges
17b	The High Hill Ranges

Fig. 2. Soil physiography and general soil type map of Bangladesh (http://en.banglapedia.org/index.php?title=Physiography).

of two uplifted blocks in the west and centre of the country called Barind and Madhupur Tracts, respectively accounting for about 8% of the land and floodplain soils distributed across the country accounting for about 80% of the land. Soil types within these physiographic groups are classified into 21 general types (Fig. 2). The cultivation practices and type of crops are exclusively dependent on these soil types (FAO, 1988). In addition to physiography and general soil types, water plays a vital role on crop production. As per FAO (1988), there are five classes of soil based on land level in relation to seasonal flooding. Water is generally scarce for cultivation in high and medium highlands. Contrarily medium lowland, lowland and very lowland are prone to flood of varying degrees during monsoon (Fig. 3). Beside these, there are special types of flood-prone areas mostly confined to the northeastern corner of the country called *haor*, a saucer-shaped vast depressed area contains *bil* in it and is inundated by water during monsoon and is dried up in winter (Fig. 4). Tidal wetland, another type of land at the southern part of the country greatly influences the crop production practices of the area. These areas are flood free zones, however are experienced of high and low tide every six hours. The tidal wetland is of two types, saline and non-saline. The saline water obviously restricts crop production severely. There are lot of *charlands* along the rivers and the coastal belt. Most of the areas having favourable environments for growing crops (Fig. 4). However, a significant area with adverse growing conditions are not unlikely depending growing season when the crop is in progress in the field.

Subtropical monsoon climate prevails in Bangladesh, which is characterized by wide seasonal variation and uneven distribution of temperature and rainfall. Monsoon wind flow plays a vital role in crop production. During warmer season, the wind brings moisture with it to rain in the rainy season. Along with the progress of the rainy season, the major rivers flow with water from the Himalya up to the brim causing flood across the country. In winter,

temperature comes down and monsoon wind ceases. As a result, cold wind flows from the north towards the bay. The cold wind mainly comes from the Himalaya, which further lowers the temperature. The winter is designated as the dry parts of the year when temperature might go down as low as 4-5° C. In contrast, the temperature may goes up beyond 40° C in the summer in some places in Bangladesh. The extreme climatic events are not uncommon. The intensity of these events vary with season or geographical location of the country.

In respect to the suitability of growing crops, FAO (1988) classified the whole land into 30 Agroecological regions (AEZ) and 88 subregions (Fig. 5). In this system, information on the environment, which is relevant for land use, was used for the assessment of agricultural potential. By adding and superimposing these information, those regions and subregions were classified. The following information was taken into account: 1. Physiography (Land forms and soil parent material), 2. Depth and duration of seasonal flooding, 3. Length of rainfed Kharif and Rabi growing periods, 4. Length of pre-Kharif period of unreliable rainfall, 5. Length of the cool winter period and 6. Frequency of occurrence of extremely high (>40 ^{o}C) summer temperature.

Agricultural land use
As described above, the country experiences a lot of environmental variations, so is the case for land use patterns. The land use in croplands involves: Single crop, double crop, triple crop, quadruple crop, current fallow etc The agricultural land use is highly dynamic in Bangladesh.

Among the cultivated crops, rice occupies about 75% of total cropped areas (Anonymous, 2016a). So all the other crops together, occupy the rest of the cropped area. Rice has the wide adaptation ability under different agroecological niches of Bangladesh. It can be cultivated from the slope of the hill to a very deep flooded areas where water depth rises around 3 m. It can be cultivated thorughout the year with an adjustment of not experience of
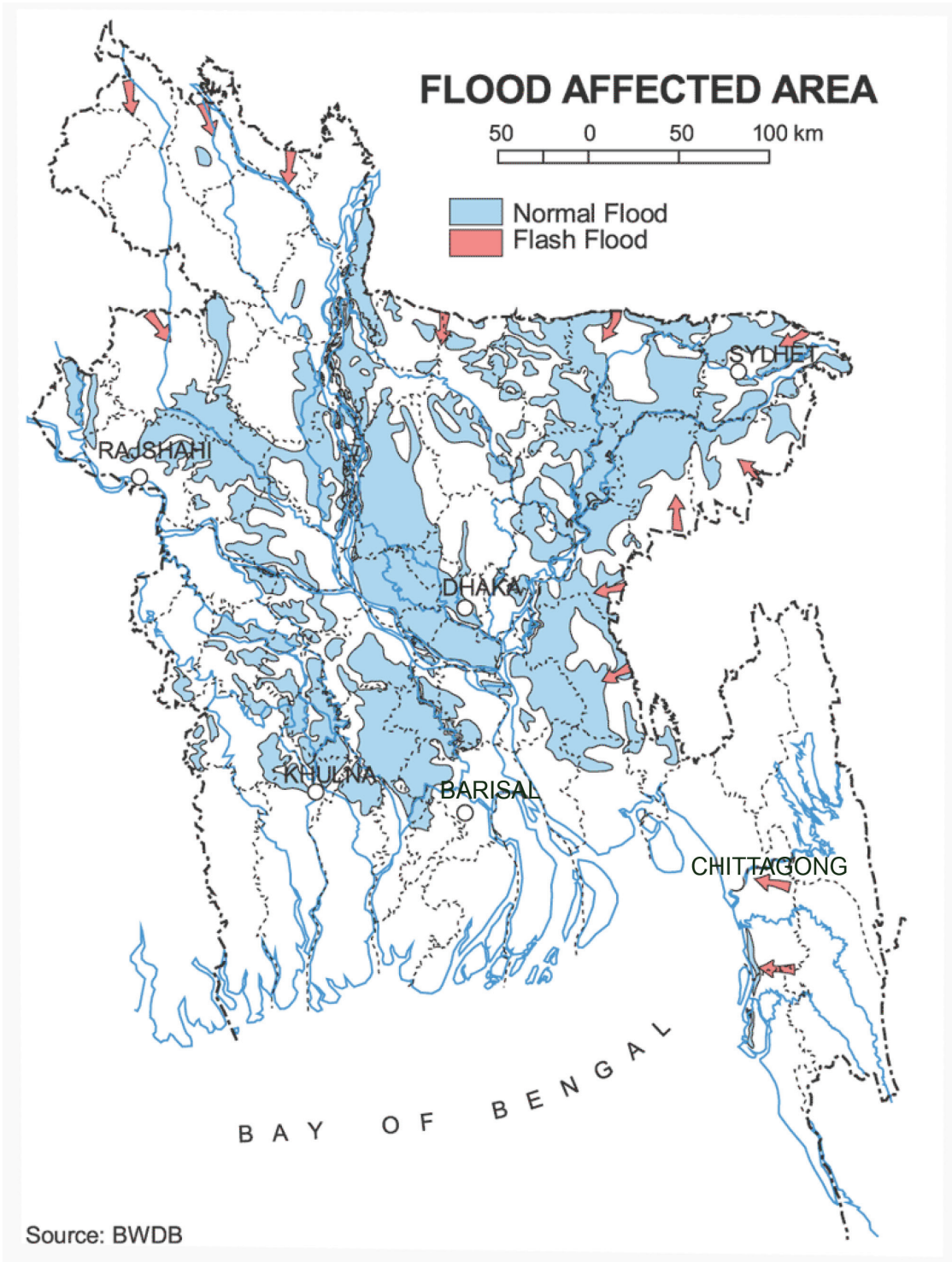
Fig. 3.   Flood affected areas of Bangladesh (http://lib.pmo.gov.bd/maps/images/bangladesh/Flood.gif).
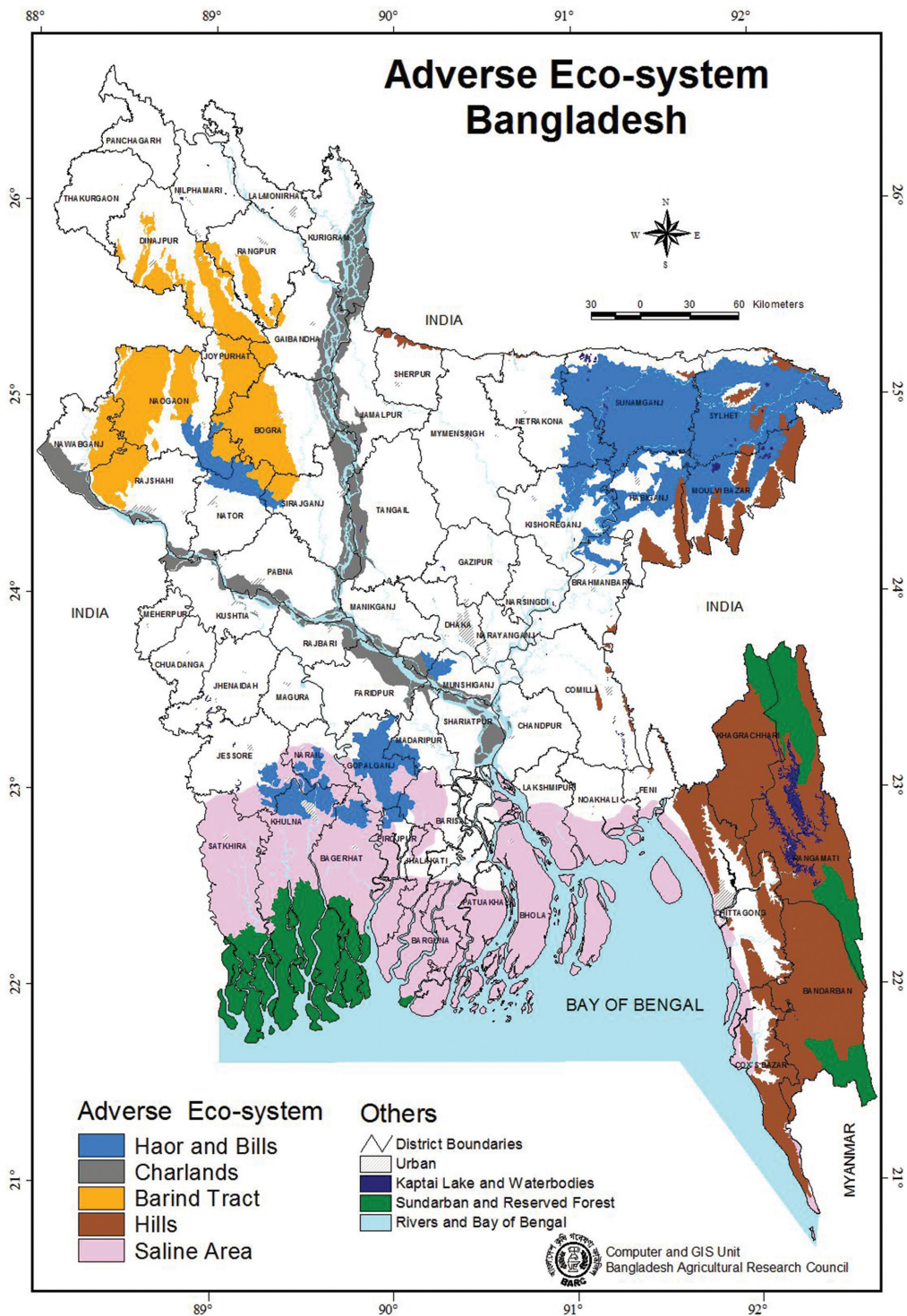
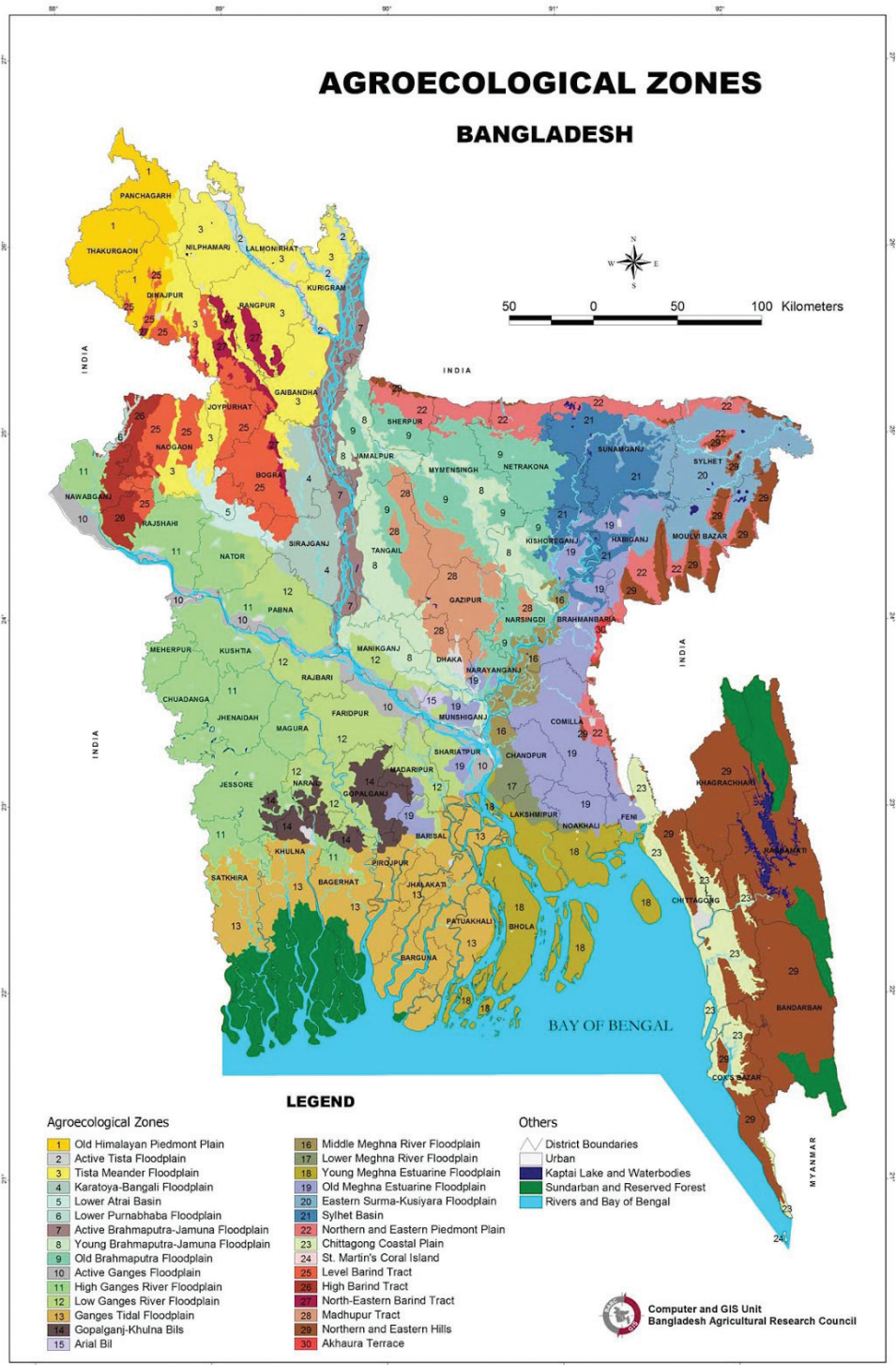Fig. 4. Adverse ecosystem map of Bangladesh (http://maps.barcapps.gov.bd/index.php?t=adverse_echo_system).

Fig. 5.   Agroecological zone map of Bangladesh (http://maps.barcapps.gov.bd/index.php?t=edaphic).

extreme temperature during the reproductive phase. Rice is the best-adapted cereal crop in the lowland soil in the wet season. No other important crops have this ability to cope with the situation. When the vast areas of our country go under flood water for considerable time in the wet season, or when intermittent flash flood affects majority of our lowlands, or when tide water rises up and falls down twice a day, rice is the only crop option to be suited in those conditions. Thus rice enables us to bring these vast areas under cultivation in unfavourable conditions.

Rice growing environments

The International Terminology for Rice Growing Environments (Khush, 1984) established a standard classification of rice ecosystems. In this system, primary classes are based on broad areas of sustained water depth. Secondary classes are based on subdivisions of water depths; the dynamics of the water regime, including the dependability of water supply; and on soil constraints in some cases. All classes of rice growing environments are widely present in Bangladesh. The primary classes are briefly defined below:

Irrigated ecosystem. The lands are irrigated with good water control and have adequate water supply throughout the growing season. Rainfall may supplement irrigation water. Rice is transplanted or direct seeded on puddle soil on levelled and bunded field. Lands represent harmonious nature of irrigated areas. Low lying areas, especially flood-prone areas are the most suitable areas. Most of the rice production comes from this ecosystem. In Bangladesh, they are scattered all over the country.

Rainfed lowland. Rainfed lowlands are usually in medium highland areas where rice cultivation depends on rainfall. After onset of rainfall, at some time, rain water accumulates on lands because of continuous and heavy rains. The soil is then puddled and rice is usually transplanted on levelled or slightly slopping bunded or dyked fields with variable depth and duration of flooding of rainfall. Soils alternate from flooded to nonflooded

conditions and thus short period of moisture stress or mild submergence may occur. The land is often submersed by flash flood. The water depth varies up to 100 cm and duration of flooding is usually not more than 10-12 days. Supplementary irrigation may be necessary. Both drought and flooding can occur within the same cropping season.

Deep water. The lowlying lands where flood water accumulates during rainy season and standing water depth vary from 50 cm to more than 3 m and flooding occurs only during part of the growing season is called deep water rice (DWR) ecosystem. Here rice is direct seeded on unbunded fields. Soil cycles from flooded to nonflooded conditions. Rice grows 50 to 60 days in rainfed field subject to drought or shallow flooding then is flooded to a depth of more than half a meter for a month or longer. The rice plant grows as flood water rises and rice is harvested after flood water recedes. Rice is often only the crop that can be grown in the flood-prone areas during flooding period. Catling *et al.* (1988) defined DWR as rice that is usually grown on land that is flooded to more than 50 cm depth for one month or more during the growing season. DWR at the early stage suffer from drought and with the onset of monsoon, it suffers from variable degrees of flooding that may last up to the reproductive stage. DWR ecosystem is different from tidal wetlands where water may rise more than 50 cm by tidal action but only for a short period in each day and from shallow flash-flood areas where rice may be submerged 50 cm or more but for up to 10-12 days.

Upland. Naturally well-drained soil with bunds or unbunded fields without surface water accumulation is called upland. Water does not stagnant even after heavy rains. Lands are level to steeply sloping. Crops suffer from lack of moisture and inadequate nutrition. Rice is direct seeded. Upland rice fields are mostly cultivated using traditional methods (predominantly slash and burn) in scattered fields. Uplands may encounter severe problems

with hard-pans, low pH sub soil, rapid onset of drought and lack of soil moisture. In the uplands, soils remain aerobic throughout the season.

Tidal wetland. Tidal wetlands are near the sea coasts and inland estuaries that are directly or indirectly influenced by tides. They are heterogeneous environments. Freshwater tidal wetlands in Bangladesh occur near inland estuaries some distance from the coast. There is little or no intrusion of saline water. The usual feature of these areas is the occurrence of daily tidal flooding between 30 to 60 cm depth, with some extremes up to 80 cm from June to September then falling sharply to 20 cm in late September. The field condition in the high tide is unsuitable for any crop but rice. The water levels in coastal rice fields fluctuate. Transplanted rice is grown in this environment and they suffer from daily high and low tidal pressure and also high depth of standing water. Tall rice seedlings with quick growing nature are transplanted to withstand submergence and tidal pressure as tides rise and fall. Saline water tidal wetland occurs near sea coast and mouth of estuaries and sea water intrusion takes place. The soil may have severe problems of salinity and other toxicity. The soil comes in contact with sea water by tidal flooding, direct inundation of sea water and by saline underground water. However, in the rainy season rain water dilutes salts of the top soil and washes away and leaches the salts and at that time intrusion of saline water is also checked by fresh water in the upstream river. So, rice production is possible at that time. The problem of salinity increases in the dry season.

In Bangladesh rice is grown in all these ecosystems. Our rice seasons generally fit into the primary classes of rice ecosystems. Boro represents irrigated ecosystem, T. Aman represents rainfed lowland and tidal wetland, Aus represents upland and B. Aman represents deep water rice ecosystem. However, with the modern rice varieties, the association between rice ecotypes and ecosystems is fading (Miah *et al.*, 2004).

Non-rice crops growing environment

Wheat is cultivated in Rabi season and it needs prolonged winter. It is best suited in well drained sandy loam soil, however, it is cultivated in range of sandy loam to clay loam soils. It is also suited to medium highland to medium lowland. Wheat is best suited in cold winter prone areas of northern districts. Wheat covers 5.23%, of the net cropped areas (NCA) (Anonymous, 2016b). Maize is cultivated in two seasons, Rabi and Kharif-I. It is suited best in loamy soils. It is found to be the best in the northern districts. It is also suited in *charlands* throughout the country. However, in most of the potato growing areas maize is followed after potato in Kharif-I season. Maize covers 3.9% of the NCA (Anonymous, 2016b).

Many of the varieties of pulses and oil seeds are well suited to our ecosystems. However, pulse and oil seed crops cover only 4.9% and 5.02%, respectively of the NCA (Anonymous, 2016b). Among the pulses, the major crops are grasspea, lentil, chickpea, blackgram and mungbean and the minor ones are pigeonpea, fieldpea, fava bean and cowpea. Grasspea, lentil, chickpea, fieldpea, cowpea and fava beans are grown during Rabi season. Blackgram is grown just after the peak of monsoon. Mungbean is grown in winter and in the late winter or in Kharif-I seasonas well. Among the oil seed crops, rapeseed and mustard, sesame and groundnut are the major crops while niger, safflower, sunflower and soybean are minor ones. Rapeseed and mustard, niger and linseed are grown in the Rabi season while groundnut, sunflower and soybean in both Rabi and Kharif-II seasons. Sesame is grown both in Kharif-I and Kharif-II seasons.

Pulses are not evenly distributed in the country. Their cultivation is mainly concentrated within the gangetic floodplain in the northern districts and in some areas of southern districts. Soils of this area are calcareous from top to certain depth, loamy in the ridges and clay in the basin. pH ranges from 6.5-8. Availability of phosphorus, calcium, molybdenum and boron is relatively high, which are important for grain legumes. Lentil, blackgram and mungbean

are grown on high and medium high lands, moderately well to poorly drained light textured soils while chickpea and grasspea are grown on medium-high to low lands, poorly drained heavy textured soils. Grasspea is grown almost all over the country in medium low and lowlands. Mungbean is grown in loam soil. It can also perform well in clay soil if it is well drained.

Rapeseed and mustard is best grown in loamy soils. It can also be cultivated in clay loam and silt loam soils. Groundnut is cultivated in sandy loam and sandy soil of *charland* on the river bank or in the basin. High land with sandy loam soil is suitable for sesame.

Jute is cultivated in loamy soils in medium highland to medium lowland. It requires natural water source near the field for its retting. Jute cultivation is scattered throughout the country, however, is concentrated in greater Faridpur and northern districts. It occupies about 8.05% of NCA (Anonymous, 2016b).

Sugarcane is cultivated in clay loam, loam and sandy loam soils. It is suited for medium highland and medium lowland. In some sandy loam soils where Boro cultivation is difficult, farmers often choose sugarcane in it. It grows well in the low Ganges river floodplain. Sugarcane covers about 1.25% of NCA (Anonymous, 2016b).

There are lots of vegetables cultivated in our country. Vegetable is cultivated in fertile and well-drained soil often near the cities and towns. Vegetables are grown round the year in three different seasons. Many temperate season's vegetable are well suited to our winter.

Cropping pattern

There are many crop growing niches seen in Bangladesh to support an unique biodiversity of crops throughout the year. Types of crops cultivated in an area and round the year is very important to increase the total crop production and productivity in that area. Distribution of crops in an area round the year can be expressed by CP. The yearly sequence and spatial arrangement of crops or crops and seasonal fallow of a given area are known as

CP. CP is an important indicator of land use, environment and socio-economic aspects of farmers of a locality. It indicates the proportion of areas under different crops in a given time. It also indicates the cropping activities in an area. In CP, crops are grown in sequence on same piece of land in a year. Here succeeding crop is established after the preceding crop has been harvested. Thus in CP there is turn around time and may or may not have a fallow period in a season. CP is very important, it allows increase in intensity and hence total production in a year as well. Climate, environment, resources and socioeconomic conditions determine the CP in an area. Climate and environments play a vital role. Presence of water is an important factor to choose a crop. Economic consideration of a farmer like irrigation, inputs, value of crops and decision of farmer and communities and government policies are also crucial. Based on appropriate consideration of all these issues farmers make a decision and construct a CP with judicious sequence.

CP or crop sequence is practically an annual strategy to optimize agronomic and economic yield in sustainable manner. CP itself is a dominant management practice in agriculture. This management not only help increase total production in a year but it influences many other management practices to be followed in it. It is so vital that many technologies, which are otherwise potential when is practiced individually, fail to show its potentiality when they have to be fitted in CP. CP controls many crop production and soil property issues. Crop diversity, input use, management, weed and disease infestation, soil physical properties like bulk density etc, cover crop, green manure, mulches, organic matter, C-N storage, erosion, water infiltration etc are influenced by CP. Thus CP provides us with a complete picture of agriculture in a locality.

The cropping patterns of Bangladesh are usually rice-based. However, these are diversified as well. The other crops in sequence are selected from the non-rice cerelas, pulses, oil crops, vegetables and fibre crops. Thus rice-based cropping patterns not only provide us

the major source of dietary energy through rice but also supplements our essential diets.

Before 1970 i.e., before the green revolution era, many cropping patterns were evolved based on the characteristics of traditional varieties, age-old management practices, socioeconomic needs and the existing environments. There has been a lot of changes and re-adjustments since the green revolution era to date. Many new crop varieties and technologies adaptable to the changing environments are coming up. The input-intensive technologies turned many direct seeded rice areas into transplanted rice areas for better efficacy of the inputs and ease of management practices. Irrigation and other technologies turned many Rabi crop growing areas into Boro growing areas. Wheat, maize and potato areas also increased. As a result, many Rabi crops including pulses and oil seeds failed to accommodate in the systems and their areas decreased significantly. Boro areas increased dramatically. DWR and direct seeded Aus and Aman areas with local varieties decreased considerably.

Uniqueness, usefulness and policy relevance of the study in Bangladesh

Distribution of crops i.e., agricultural land occupied by different crops is an important consideration which is usually expressed by CP. Study of CP has lots of merits. However, only some sporadic studies are found on this subject (Ali, 2014; Chowdhury *et al*., 2008; Hossain *et al*., 2016; Shahidullah *et al*., 2006), they are mostly confined for a small locality. Rice Farming Systems Division of BRRI conducted an earlier study during the end of 1990, which was a bit similar to this study based on data collected from DAE on CP (Nur-E-Elahi *et al*., 2001). The study was not very huge, narrow in presentation, however, district wise major CPs were identified. Contrarily, current study is huge. It presents information on CPs throughout the country in each and every upazila. List of CPs, their area coverage,

their relation with other land use parameters, groups of CPs according to major crops and related information is accumulated in this study. Stakeholders need information on crops, their spatial and temporal distribution, their environment and management in different areas of the country, which is very vital in decision making. No study can provide us with this information. This study is a means to solve the gap on this vital aspect of information. This study has many implications to the concerned stakeholders. Farmers will have ideas about his ecosystems and land use and avenue of improvement/intervention. Researchers will have avenues on crops and varieties and their areas of improvement, use of inputs tagged with existing environment and integration of component technologies to get potential yield of the CP. Policy makers and extension personnel will get ideas on material and capital input mobilization, technology transfer etc to explore the potential yield of the system. Thus, this study may be considered as vital and unique by its nature.

Justification and objective of the study

CP brings appropriate crops and management in appropriate space and time. Improved formation of CP helps to approach the sustainable food security. The information related to CP is quite vital to the farmer, researcher and extension experts. Even the policy makers would have the idea to formulate the policy issues from the major CPs of the country. Unfortunately, we have a little updated knowledge about the CP of the whole country. It is not known how many CPs are there or what is the most dominant CP with its area coverage or related information all over the country. It is also not known how many CPs are there with a specific crop in it or CP without rice crops. The present study is an attempt to answer those questions, and aims to study agricultural land use and CP and create data base on it across the whole country with a view to exploring the potential of CPs in future from these information.

METHODOLOGY

The study was conducted following two steps.

- Collection and analysis of secondary data and find out the mismatching of the data.
- Conducting stakeholder consultation workshop to review, verify and validate mismatch data discussing with the relevant sources and finalize data.

Collection and analysis of secondary data and finding mismatch

Present study was carried out basically using secondary source of information from the Department of Agricultural Extension (DAE). DAE keeps records of crops in every nook and corner of the country. At the grass root level, in the blocks, Sub Assistant Agriculture Officer (SAAO) collects data from the field. They use Mauza map to identify NCA and the land use for non-agricultural purposes. In the cropped area, major crop growing field and their coverage is also identified. SAAO conducts survey following the possible ways to collect data. They collect the list of farmers and their lands from the manager of each Boro irrigation scheme. They also make list of farmers for the other major crops like T. Aman, Aus, wheat, jute etc and for minor crops as well. They collected data by interviewing farmers who cultivate different crops, use different varieties in respective hecterage. He also uses his own judgment by his own eye estimation. Finally observing the actual harvest area, judging by his own experience, the individual crop, their varieties and coverage are identified. By these ways they keep data of each and every crop and their coverage in his blocks. Combining block data, union, then upazila, then district data are compiled and kept in the record book of DAE. Thus in each upazila, season wise cultivated crops and their coverage are recorded.

DAE also keeps information on CP. Each crop is cultivated in a specific field in a single, double, triple or quadruple CP. Based on individual crops coverage, the area of a crop in a CP is distributed. Other crops of these CP have to match in their respective coverage. Thus individual CP coverage data were developed.

Data we used in this study were collected from DAE. A semi-structured questionnaire was developed for data collectionon crop, CP, their area coverage etc for the year of 2014. A small team of investigators visited the Deputy Director (DD), DAE office. They collected the secondary information of crops, their hecterage from each upazila from the district office. The questionnaires were then distributed to each upazila to collect information on CPs and their hectarage and other related issues. Upazila Agriculture Office filled up the questionnaires and sent back to the investigators. These data were analyzed to find out the mismatch of data, if any, among the data and any query regarding them.

Conducting stakeholder consultation workshop

Two sets of data, one collected from DD Office on crop and their coverage in each upazila and the other collected through questionnaire on CP and their coverage from Upazila Agriculture Office were analyzed. After analysis of the data, usually there were some mismatches of data and were some information that needed further clarification. To purify and finalize this information stakeholder consultation workshops were conducted in 64 districts separately to work on upazila level data. A team of investigators (researchers) visited each district and organized a workshop. In the workshop, DD and district level all concerned officers of DAE and from upazila level UAO, AEO, UAA, SAPPO, SAAOs of respective upazila attended. In the workshop if there is a mismatch of data or any other query on data, researchers pointed out it for discussion. Then the data were finalized. The whole study was conducted from August 2015 to November 2016, throughout the country.

Thus the data used for final analysis were the overviewed data. The CP for the present study with its hectarage means the proportion of areas under different CPs in each upazila in 2014.

Analysis of data

Collected data were analyzed using Micro Soft Excel programme. Tally, addition, average and descriptive statistics were used for presentation of data. Based on these data, tables were constructed and discussed accordingly.

Limitation of the data

The data were collected from administrative area i.e., from each upazila of the country. So results were presented easily for upazila, district or region. However, among the upazilas there is transboundary ecosystem coverage where parts of the upazila are taken into account. Examples are *Barind* tract, *haor* areas, tidal wetlands etc These areas extend transboundary of more than one upazilas. Exact ecosystem-wise result presentation is difficult in this study. Primary level data collection, ground truthing etc were not included in this study.

Relevant terminology

Land use. The utilization of surface of a land on a specific space at a given time is called land use. When a land is utilized for agricultural purpose, it may be termed as agricultural land use.

CP. The sequence of crops or crops and fallow on a given area in a year. It includes the seasonal and annual crops, not the perennial crops. Seasonal crops can be sequenced by other seasonal crops or fallow. Annual crops may be replaced after its harvest. So, these are included in CP. Perennial crops, orchard crops, tree crops are not sequenced. So they are excluded from the CP. In case of mixed crops or inter crops, the area in which they are cultivated from it, the portion of area of a companion crop occupied is calculated using land equivalent ratio. CP is generally denoted by writing the crop's name one after another separated by dash sign. Serial of crops indicates the sequence, which is demarcated by dash sign. If in one season the land remained fallow, instead of crop name fallow was written. Writing CP generally started from Rabi or Boro season followed by Kharif-I or Aus then Kharif-II or Aman season. The examples are: Potato-Maize-T. Aman, Boro-Fallow-Fallow etc. If two crops are grown in one season in a CP, e.g., two potato crops in Rabi season, a dash is used in between the crops e.g., Potato-Potato-Aus- T. Aman. Other than arable crops, e.g., orchard fruit crops, plantation tree, social forest, bamboo bushes, homestead crops, rooftop crops were not considered as crops of CP. Very minor CPs in terms of area coverage, was not included in our CP list. However, they were included in 'Other' category (Table 2) and were used in calculation of CP of respective upazila.

Fallow. In a temporal distribution of crops in a land in a year, if a season remains uncultivated it is considered as fallow. Fallow lands may be converted to cultivated land. Unfavourable weather like flood or socioeconomic conditions may cause a land to remain fallow.

Current fallow (CF). If a cultivable land remains fallow throughout the year, it is called CF. However, if a land remains fallow in one season, but cultivated in another season in a year, it is not CF. CF was not considered in NCA.

Net cropped area (NCA): A cultivable land may be either cultivated or remained fallow throughout the year. When a land is cultivated, one or two or three crops round the year may be cultivated in it. The summation of cultivated land area of a region is called NCA. Thus, it is the actual area under crop in a specific year. CF is not considered in it.

Single cropped area/DCA/TCA/QCA: If only one crop is cultivated in a year in an arable land, the area is called SCA. Using similar sense double, triple and quadruple crop areas are defined.

Total cropped area. It is the summation of area cultivated once as well as more than once in a particular year. When two crops in sequence are cultivated in a land in a year, the area is counted twice and so on for three and four crops. Thus it is the summation of SCA x 1, DCA x 2, TCA x 3 and QCA x 4.

Cropping intensity (CI). CI is the ratio of total cropped area and NCA in a particular region in a year. It practically indicates number of crops cultivated in ayear in a specific land. It is expressed in percentage.

Annual crops (AC). Annual crops are the crops which are cultivated throughout the year, e.g., sugarcane, banana, papaya. These crops are considered in crops of CP, as in the next year cultivation of these crops may be replaced by other seasonal crops in sequence. As such they are included in NCA. Contrarily in Boro-Fallow-Fallow CP, Boro crop is not an annual crop but a seasonal crop.

Fruit crops. Permanent perennial fruit-bearing crops. They are not considered in CP as they have no sequence. However, annual fruit crops i.e., banana, papaya etc are differed from it and were considered in crops of CP as stated above. If arable field crop is cultivated with fruit trees as intercrop, land equivalent ration of the field crop was considered and this field crop was put into CP.

Timber crops and bamboo bushes. Timber producing permanent and perennial trees and bamboo bushes were not considered in CP as they have no temporal sequence.

Crop diversity index was calculated by using the following equation described by Kshirsagar *et al*. (1997).

$$CDI_i = 1 - \sum_{j=o}^{n} \left(\frac{a_{ij}}{A_i} \right)^2$$

Where, CDI$_i$: Crop *Diversity* Index
   a$_{ij}$: Area planted to the jth crop in the ith location
   A$_i$: Total area planted under all crops

The index is zero for a land area growing only one crop. It approaches unity as the level of diversity increases.

RESULTS AND DISCUSSIN

Many striking results were revealed when data were analyzed by spread-sheet. Table 1 shows the district-wise common land use pattern of Bangladesh as represented by annual crop area, SCA, DCA, TCA, QCA, others, NCA and CI. DCA dominated in different districts

in comparison to SCA or TCA except in Narayanganj, Pirojpur, Sirajganj, Sunamganj, Tangail and Rangamati. These districts have more low-lying areas except Rangamati. Therefore, single Boro CP dominated in those districts. Whereas, in Rangamati, single season *jhum* cultivation is dominated. QCA was extremely low in most of the districts. It was the highest in Bogra followed by Naogoan and Jessore. As QCA was very low, it contributed less to CI i.e., number of crops in yearly sequence. However, the region which had more TCA, consequently had greater CI. TCA was the highest in Bogra district followed by Naogoan and Dinajpur districts. Bogra district had the highest CI followed by Kushtia, Laxmipur and Thakurgoan districts. Lowest CI was found in Sunamganj followed by Rangamati and Gopalganj. Sunamganj and Gopalganj are *haor* and low lying areas where scope of cultivation of crops is only possible in Rabi season and in Rangamati, a hilly region, only *jhum* crops are grown in one season. Annual crop (AC) area was the highest in Tangail followed by Natore and Rangamati. Thus these districts produced more banana, papaya, turmeric, ginger etc. Table 24 presents the information on ACs. NCA of the country was more than 8 million hectares. Population pressure, urbanization and industrialization will reduce this figure gradually. However, we have to get our future food from this land. Kabir *et al*. (2015) mentioned the current NCA to be 7.81 million hectares and they projected it to be 7.71, 7.49 and 7.18 million hectares in 2021, 2031 and 2041, respectively. Mymensingh had the highest NCA followed by Dinajpur and Naogoan districts. Increased NCA might be because of bigger geographical area of the districts and increased arable areas as well. The country's average indicated that DCA was more than the sum of AC, SCA, TCA QCA and more than twice of the SCA or TCA, separately. QCA was quite negligible, which was 0.22% of the NCA. The average CI was 200%.

Table 1. District-wise land use in Bangladesh (area in hectare), 2014-15.

	District	Annual crop	SCA	DCA	TCA	QCA	Others	NCA	CI (%)
01	Brahmanbaria	290	59760	67390	10920	50	1040	139450	165
02	Bagerhat	3430	48570	51750	8640	0	1140	113530	161
03	Bandarban	13680	12110	13370	930	0	640	40730	138
04	Barguna	630	19260	41180	37770	0	830	99670	218
05	Barisal	5095	33320	92355	26175	0	1515	158460	192
06	Bhola	5205	9130	105000	65995	0	1050	186380	228
07	Bogra	1520	8940	98550	106610	5070	1460	222150	248
08	Chandpur	945	24100	50200	15480	150	1105	91980	190
09	Chapainawabganj	11160	15280	46170	46980	0	770	120360	217
10	Chittagong	5180	70220	88230	34785	0	1715	200130	180
11	Chuadanga	3400	2220	55880	26110	350	490	88450	224
12	Comilla	980	45675	92540	63550	2300	1855	206900	210
13	CoxBazar	3830	13250	52680	14475	50	1095	85380	197
14	Dhaka	740	17970	32990	15730	0	710	68140	196
15	Dinajpur	4145	800	188505	81350	210	1830	276840	228
16	Faridpur	5590	8530	75990	48750	0	1130	139990	225
17	Feni	280	16300	49785	4810	0	755	71930	183
18	Gaibandha	4110	10540	105980	29680	0	1050	151360	210
19	Gazipur	7520	33775	35095	8250	0	730	85370	161
20	Gopalganj	1790	68200	32775	9665	0	710	113140	146
21	Habiganj	1200	71350	73160	21615	0	1125	168450	170
22	Jamalpur	2810	7950	106340	42600	90	1020	160810	220
23	Jessore	4020	19440	97740	64660	2880	1230	189970	225
24	Jhalakati	2830	10640	29950	7870	0	610	51900	189
25	Jhenaidaha	10150	6790	73590	47780	700	840	139850	223
26	Joypurhat	1500	110	22425	53715	0	750	78500	267
27	Khagrachhari	10220	13140	17960	2170	0	830	44320	151
28	Khulna	1080	54915	65495	4605	0	985	127080	159
29	Kishoreganj	1490	111950	58035	26335	350	1680	199840	156
30	Kurigram	1760	14030	95755	36465	10	1340	149360	214
31	Kushtia	7280	3260	48260	54410	700	870	114780	240
32	Lakshmipur	400	6400	46210	45435	450	1005	99900	240
33	Lalmonirhat	1290	3090	66740	26955	0	765	98840	223
34	Madaripur	1040	16100	44890	20770	0	590	83390	204
35	Magura	1660	2580	28190	42730	0	650	75810	251
36	Manikganj	2350	11500	54070	24680	0	790	93390	212
37	Maulvibazar	1820	48925	66270	9635	0	820	127470	168
38	Meherpur	2340	640	26900	23830	0	380	54090	239
39	Munsiganj	190	17670	39280	3870	0	790	61800	177
40	Mymensingh	6060	34730	208220	38835	100	1715	289660	199
41	Naogaon	2500	33690	143520	86050	3530	1610	270900	221
42	Narail	1670	6450	50330	15110	0	410	73970	210
43	Narayanganj	180	18780	17900	2410	0	410	39680	158
44	Narsingdi	2850	20600	38220	9840	0	730	72240	181
45	Natore	17240	13150	59780	44035	0	1035	135240	210

Table 1. Continued.

	District	Annual crop	SCA	DCA	TCA	QCA	Other	NCA	CI (%)
46	Netrokona	310	85560	106545	6005	0	1290	199710	160
47	Nilphamari	2310	2650	81340	34510	0	800	121610	224
48	Noakhali	1540	76910	84750	34215	0	1115	198530	178
49	Pabna	5920	14020	88870	74060	30	1370	184270	230
50	Panchagarh	2310	4130	72200	22860	0	710	102210	216
51	Patuakhali	1345	35950	129250	44035	0	1200	211780	203
52	Pirojpur	2130	36105	35925	7255	0	865	82280	162
53	Rajbari	2360	6670	31800	34390	0	740	75960	234
54	Rajshahi	10420	12320	86100	55820	1100	1360	167120	221
55	Rangamati	14380	17625	10010	910	0	755	43680	128
56	Rangpur	4350	8970	101490	59140	200	1100	175250	227
57	Satkhira	1830	28250	68820	21370	110	1050	121430	193
58	Shariatpur	1260	23185	45540	7250	0	775	78010	178
59	Sherpur	760	4330	77140	17610	0	720	100560	213
60	Sirajganj	2440	27585	111615	40645	0	1235	183520	206
61	Sunamganj	510	206805	55400	3560	0	1135	267410	123
62	Sylhet	1100	110350	88120	8955	0	1625	210150	151
63	Tangail	20250	18640	144385	47820	250	1705	233050	204
64	Thakurgaon	2790	1710	80360	62890	0	640	148390	240
	Bangladesh	243765	1787595	4455305	1996365	18680	64790	8566500	200

Table 2. List of cropping patterns in Bangladesh, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
001	Boro−Fallow−T. Aman	2306005	26.919	63	426
002	Boro−Fallow−Fallow	1139530	13.302	59	342
003	Fallow−Fallow−T. Aman	509480	5.947	36	162
004	Boro−Aus−T. Aman	209015	2.440	47	177
005	Fallow−Aus−T. Aman	193275	2.256	30	108
006	Mustard−Boro−T. Aman	184620	2.155	51	203
007	Boro−B.Aman	183070	2.137	32	113
008	Potato−Boro−T. Aman	180380	2.106	33	115
009	Wheat−Jute−T. Aman	147210	1.718	43	216
010	Vegetable−Vegetable−Vegetable	143270	1.672	61	283
011	Mustard−Boro−Fallow	143130	1.671	37	112
012	Grasspea−Fallow−T. Aman	108150	1.262	25	80
013	Maize−Fallow−T. Aman	101460	1.184	39	126
014	Wheat−Fallow−T. Aman	90910	1.061	39	100
015	Mungbean−Fallow−T. Aman	89650	1.047	22	70
016	Grasspea−Aus−T. Aman	81610	0.953	19	61
017	Vegetable−Fallow−T. Aman	74710	0.872	45	170
018	Vegetable−Vegetable−Fallow	63935	0.746	59	168
019	Onion−Jute−T. Aman	54185	0.633	39	102
020	Mungbean−Aus−T. Aman	53730	0.627	14	43
021	Chilli−Fallow−T. Aman	52995	0.619	45	146
022	Lentil−Jute−T. Aman	51875	0.606	34	96
023	Vegetable−Vegetable−T. Aman	51745	0.604	49	127

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
024	Wheat−Jute−Fallow	48700	0.568	32	82
025	Potato−Maize−T. Aman	47690	0.557	19	68
026	Boro−Aus−Fallow	45865	0.535	34	71
027	Onion−Jute−Fallow	45200	0.528	29	67
028	Boro−Jute−T. Aman	40440	0.472	19	56
029	Felon−Fallow−T. Aman	37675	0.440	14	53
030	Mustard−Boro−B.Aman	36520	0.426	14	32
031	Wheat−Aus−T. Aman	36425	0.425	35	93
032	Mustard−Jute−T. Aman	32740	0.382	29	64
033	Lentil−Jute−Fallow	32360	0.378	27	67
034	Boro−Fish	31400	0.367	3	17
035	Vegetable−Fallow−Fallow	31115	0.363	35	84
036	Groundnut−Fallow−T. Aman	29210	0.341	23	60
037	Vegetable−Aus−T. Aman	28700	0.335	42	87
038	Water Melon−Fallow−T. Aman	28340	0.331	17	49
039	Potato−Jute−T. Aman	28310	0.330	36	95
040	Potato−B.Aman	23900	0.279	9	25
041	Soybean−Fallow−T. Aman	23670	0.276	5	10
042	Soybean−Aus−T. Aman	23170	0.270	5	8
043	Potato−Fallow−T. Aman	22715	0.265	34	108
044	Potato−Aus−T. Aman	22405	0.262	29	79
045	Wheat−Mungbean−T. Aman	21760	0.254	20	50
046	Grasspea−B.Aman	21480	0.251	21	52
047	Maize−Jute−Fallow	21425	0.250	19	33
048	Maize−Jute−T. Aman	21325	0.249	18	38
049	Vegetable−Boro−T. Aman	21220	0.248	22	42
050	Grasspea−Jute−Fallow	21000	0.245	21	39
051	Fish−T. Aman	20400	0.238	3	8
052	Soybean−Jute−T. Aman	20000	0.233	4	6
053	Potato−Boro−Fallow	19360	0.226	17	27
054	Mustard−Boro−Aus	18140	0.212	10	16
055	Mustard−B.Aman	17210	0.201	12	24
056	Mustard−Jute−Fallow	17180	0.201	16	35
057	Sweet Potato−Fallow−T. Aman	16990	0.198	31	103
058	Groundnut−Fallow−Fallow	16485	0.192	35	76
059	Boro−Jute−Fallow	16370	0.191	19	25
060	Fallow−B.Aman	16360	0.191	15	29
061	Wheat−Maize−T. Aman	16320	0.191	9	14
062	Wheat−Aus−Fallow	16200	0.189	17	26
063	Vegetable−Aus−Fallow	15940	0.186	23	41
064	Tobacco−Jute−T. Aman	15200	0.177	9	19
065	Mustard−Fallow−T. Aman	14870	0.174	33	84
066	Groundnut− Aus−T. Aman	14535	0.170	10	18
067	Potato−Jute−Fallow	14515	0.169	25	53
068	Boro−Sesbania−T. Aman	14490	0.169	20	33
069	Chilli−Aus−T. Aman	14240	0.166	21	38
070	Wheat−B.Aman	13835	0.162	16	32

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
071	Mustard−Aus−T. Aman	13790	0.161	30	52
072	Fallow−Jute−T. Aman	13620	0.159	18	32
073	Maize−Aus−Fallow	13615	0.159	14	18
074	Garlic−Jute−Fallow	13475	0.157	26	48
075	Boro−Vegetable (Float/Norm)	13335	0.156	27	36
076	Boro−Fallow−Blackgram	13270	0.155	27	44
077	Chilli−Jute−Fallow	13260	0.155	22	54
078	Vegetable−Jute−Fallow	13185	0.154	26	47
079	Garlic−Jute−T. Aman	13090	0.153	38	78
080	Wheat−Aus−Blackgram	13000	0.152	6	8
081	Maize−Fallow−Fallow	12920	0.151	22	38
082	Lentil−Fallow−T. Aman	12680	0.148	29	68
083	Potato−Vegetable−T. Aman	12620	0.147	30	59
084	Lentil−Sesame−T. Aman	12450	0.145	14	33
085	Fallow−Aus+Non-rice (*jhum*)	11900	0.139	3	20
086	Onion−Vegetable−Vegetable	11735	0.137	39	87
087	Fallow−Sesame−T. Aman	11640	0.136	13	20
088	Vegetable−Jute−T. Aman	11305	0.132	25	51
089	Lentil−Aus−T. Aman	11255	0.131	25	46
090	Onion−B.Aman	10905	0.127	14	27
091	Garlic−B.Aman	10850	0.127	15	21
092	Potato−Sesbania	10770	0.126	5	15
093	Wheat−Sesame−T. Aman	10650	0.124	15	33
094	Water Melon−Aus−T. Aman	10355	0.121	11	14
095	Grasspea−Jute−T. Aman	10300	0.120	25	43
096	Potato−Maize−Fallow	9640	0.113	10	16
097	Chilli−Fallow−Fallow	9265	0.108	40	66
098	Sesame−Fallow−T. Aman	9265	0.108	19	31
099	Felon−Aus−T. Aman	9245	0.108	7	16
100	Boro−Sesbania−Fallow	9180	0.107	12	19
101	Chilli−B.Aman	9120	0.106	10	23
102	Chilli−Vegetable−Fallow	8810	0.103	44	104
103	Onion−Aus−Fallow	8705	0.102	12	17
104	Fallow−Fallow−Blackgram	8695	0.102	34	59
105	Boro−Vegetable−T. Aman	8660	0.101	9	16
106	Boro−Aus−Blackgram	8540	0.100	5	5
107	Sweet Potato−Fallow−Fallow	7980	0.093	37	98
108	Mustard−Boro−Aus−T. Aman	7850	0.092	14	30
109	Blackgram−B.Aman	7625	0.089	11	24
110	Chilli−Aus−Fallow	7565	0.088	14	27
111	Tobacco−Maize−T. Aman	7470	0.087	5	12
112	Potato−Boro−Aus	7420	0.087	4	6
113	Coriander−Jute−Fallow	7390	0.086	15	25
114	Chilli−Jute−T. Aman	7250	0.085	20	35
115	Fallow−Vegetable−T. Aman	7130	0.083	16	29
116	Maize−Vegetable−Fallow	7120	0.083	14	19
117	Vegetable−Boro−Fallow	7100	0.083	9	10

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
118	Lentil−Mungbean−T. Aman	6955	0.081	11	22
119	Lentil−B.Aman	6550	0.076	16	30
120	Onion−Fallow−T. Aman	6380	0.074	32	64
121	Lentil−Vegetable−Vegetable	6330	0.074	19	30
122	Mustard−Maize−T. Aman	6310	0.074	9	19
123	Wheat−Vegetable−Vegetable	6100	0.071	16	21
124	Tobacco−Aus−T. Aman	6040	0.071	5	12
125	Soybean−B.Aman	5650	0.066	4	4
126	Boro−Fallow−T. Aman +Fish	5410	0.063	3	7
127	Tobacco−Fallow−T. Aman	5310	0.062	7	15
128	Wheat−Vegetable−T. Aman	5205	0.061	15	25
129	Vegetable−B.Aman	5200	0.061	9	17
130	Maize−B.Aman	5030	0.059	10	15
131	Mustard−Aus−Fallow	4935	0.058	15	22
132	Maize−Mungbean−T. Aman	4900	0.057	1	3
133	Mustard−Mungbean−T. Aman	4710	0.055	12	18
134	Chickpea−Fallow−T. Aman	4700	0.055	12	32
135	Grasspea−Boro−Fallow	4690	0.055	8	12
136	Coriander−Jute−T. Aman	4625	0.054	17	30
137	Lentil−Aus−Fallow	4570	0.053	11	15
138	Vegetable−Maize−T. Aman	4500	0.053	9	15
139	Garlic−Vegetable−Vegetable	4385	0.051	27	68
140	Potato−Maize−Aus	4300	0.050	3	4
141	Onion−Aus−T. Aman	4260	0.050	17	26
142	Tobacco−Jute−Fallow	4050	0.047	4	8
143	Wheat−Jute−Blackgram	3910	0.046	7	9
144	Wheat−Fallow−Fallow	3810	0.044	6	8
145	Wheat−Chilli−Fallow	3780	0.044	7	9
146	Maize−Maize−Fallow	3720	0.043	3	5
147	Wheat−Fallow−T. Aman (Orchard)	3700	0.043	1	2
148	Garlic−Fallow−T. Aman	3680	0.043	31	59
149	Lentil−Sesame−Fallow	3680	0.043	15	20
150	Chilli−Boro−Jute	3600	0.042	2	3
151	Maize−Fallow−Blackgram	3600	0.042	4	4
152	Vegetable−Fallow−Blackgram	3525	0.041	16	33
153	Fallow−B.Aus+B.Aman	3470	0.041	3	5
154	Sweet Potato−Jute−Fallow	3380	0.039	13	21
155	Mustard−Sesame−T. Aman	3360	0.039	12	15
156	Vegetable−Onion−Aus	3200	0.037	3	3
157	Tobacco−Aus−Fallow	3180	0.037	5	10
158	Coriander−Fallow−Fallow	3175	0.037	41	64
159	Potato−Boro−Aus−T. Aman	3140	0.037	5	9
160	Onion−Sesame−T. Aman	3080	0.036	4	6
161	Maize−Maize−T. Aman	3070	0.036	6	8
162	Wheat−Maize−Fallow	3070	0.036	2	4
163	Sesame−Fallow−Blackgram	3060	0.036	6	10
164	Maize−Aus−Vegetable	3000	0.035	3	4

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
165	Mustard−Boro−Jute	3000	0.035	5	7
166	Mustard−Boro−Jute−T. Aman	2980	0.035	7	13
167	Maize−Aus−T. Aman	2970	0.035	17	27
168	Lentil−Maize−T. Aman	2920	0.034	4	8
169	Wheat−Mungbean−Fallow	2875	0.034	5	7
170	Groundnut−B.Aman	2820	0.033	5	7
171	Lentil−Fallow−Fallow(Orchard)	2780	0.032	3	5
172	Fallow−Sesame+B.Aman	2750	0.032	5	7
173	Potato−Groundnut−T. Aman	2720	0.032	3	5
174	Soybean−Fallow−Fallow	2710	0.032	3	4
175	Grasspea−Boro−B.Aman	2700	0.032	3	3
176	Lentil−Vegetable−T. Aman	2660	0.031	11	11
177	Vegetable−Groundnut−T. Aman	2660	0.031	4	5
178	Pea−B.Aman	2620	0.031	11	16
179	Garlic−Mungbean−T. Aman	2500	0.029	1	2
180	Garlic−Aus−T. Aman	2400	0.028	13	20
181	Millet(Kaon)−Fallow−T. Aman	2390	0.028	6	6
182	Muskmelon−Fallow−T. Aman	2310	0.027	10	23
183	Potato−Aus−Fallow	2310	0.027	13	16
184	Tobacco−Boro−T. Aman	2300	0.027	3	4
185	Blackgram−Jute−Fallow	2295	0.027	12	16
186	Grasspea−Fallow−Fallow	2295	0.027	9	11
187	Fallow−Fallow−T. Aman +Fish	2200	0.026	2	2
188	Potato−Maize−Vegetable	2190	0.026	4	4
189	Coriander−Fallow−T. Aman	2185	0.026	31	62
190	Vegetable−Maize−Fallow	2180	0.025	6	7
191	Potato−Boro−Jute−T. Aman	2160	0.025	4	5
192	Sweet Potato−Aus−T. Aman	2150	0.025	2	2
193	Wheat−Mung−Fallow(Orchard)	2150	0.025	2	3
194	Onion−Sesame+B.Aman	2100	0.025	2	3
195	Pea−Jute−Fallow	2100	0.025	10	15
196	Sunflower−Fallow−T. Aman	2100	0.025	7	23
197	Coriander−Vegetable−Fallow	2090	0.024	20	29
198	Potato−Chilli−Fallow	2070	0.024	10	17
199	Potato−Sesame−T. Aman	2060	0.024	15	23
200	Blackgram(Fodder)−Boro−B.Aman	2000	0.023	1	1
201	Wheat−Maize−Vegetable	2000	0.023	2	2
202	Pea−Fallow−T. Aman	1950	0.023	18	27
203	Potato−Sesame−Fallow	1930	0.023	6	10
204	Blackgram−Jute−T. Aman	1900	0.022	11	14
205	Mustard−Aus−Blackgram	1900	0.022	2	2
206	Mustard−Jute−Vegetable	1900	0.022	3	5
207	Wheat−Aus−Onion	1900	0.022	1	1
208	Blackcumin−Jute−Fallow	1840	0.021	6	12
209	Maize−Sesame−T. Aman	1835	0.021	6	9
210	Maize−Vegetable−T. Aman	1810	0.021	11	12
211	Millet(Kaon)+Sesame−Fallow	1810	0.021	5	7

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
212	Onion−Aus−Blackgram	1810	0.021	5	6
213	Grasspea−Boro−Aus	1800	0.021	1	1
214	Grasspea−Sesame+B.Aman	1800	0.021	2	2
215	Grasspea−Sesame−T. Aman	1790	0.021	5	6
216	Grasspea−Sesbania−Fallow	1780	0.021	4	4
217	Mustard−B.Aus+B.Aman	1780	0.021	4	4
218	Blackgram−Aus−T. Aman	1735	0.020	10	13
219	Mustard−Sesame+B.Aman	1650	0.019	3	4
220	Tobacco−Sesbania−T. Aman	1620	0.019	1	2
221	Vegetable−Aus−Blackgram	1610	0.019	4	4
222	Grasspea−B.Aus+B.Aman	1580	0.018	6	8
223	Maize−Sesame−Fallow	1580	0.018	6	8
224	Groundnut− Aus−Fallow	1550	0.018	5	5
225	Wheat−Sesame−Fallow	1550	0.018	7	8
226	Groundnut−Jute−T. Aman	1530	0.018	7	13
227	Boro−Fallow−Maize	1500	0.018	1	1
228	Tobacco−Vegetable−Vegetable	1500	0.018	1	1
229	Onion−Maize−T. Aman	1490	0.017	7	9
230	Coriander−B.Aman	1480	0.017	11	11
231	Garlic−Aus−Fallow	1450	0.017	12	15
232	Vegetable−Jute−Vegetable	1450	0.017	5	5
233	Chilli−Vegetable−T. Aman	1405	0.016	15	19
234	Fallow−Aus−Fallow	1400	0.016	3	3
235	Maize−Boro−T. Aman	1400	0.016	2	2
236	Maize−Aus−Blackgram	1370	0.016	3	3
237	Cotton−Aus−Fallow	1330	0.016	3	3
238	Grasspea−Sesame−Fallow	1330	0.016	7	10
239	Groundnut−Fallow−Blackgram	1320	0.015	3	3
240	Wheat−Jute−Vegetable	1320	0.015	6	6
241	Pea−Aus−Vegetable	1310	0.015	7	8
242	Onion−Sesame−Fallow	1270	0.015	8	9
243	Blackcumin−Jute−T. Aman	1260	0.015	6	11
244	Sesame−Aus−Fallow	1190	0.014	3	4
245	Sesame−Aus−T. Aman	1180	0.014	4	5
246	Water Melon−Fallow−Fallow	1165	0.014	9	12
247	Pea−Vegetable−Fallow	1160	0.014	4	5
248	Potato−Mungbean−T. Aman	1140	0.013	11	13
249	Potato−Groundnut	1110	0.013	5	8
250	Tobacco−Fallow−Fallow	1045	0.012	5	8
251	Potato−Maize−Aus−Vegetable	1030	0.012	3	3
252	Fallow−Fallow−T. Aman (Orchard)	1000	0.012	1	1
253	Maize−Sesbania−Fallow	1000	0.012	1	1
254	Lentil−Sesame+B.Aman	980	0.011	1	1
255	Maize−Mungbean−Vegetable	950	0.011	3	3
256	Millet (Cheena)−Fallow−Fallow	935	0.011	5	6
257	Potato−Sweet gourd−Aus	910	0.011	6	8
258	Wheat−Fallow−Blackgram	900	0.011	1	1

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
259	Mustard−Fallow−Fallow	895	0.010	9	13
260	Coriander−Sesame−T. Aman	845	0.010	5	5
261	Vegetable−Boro−Aus−T. Aman	820	0.010	4	5
262	Vegetable−Boro−Jute	800	0.009	2	3
263	Potato+Sweetgourd−Aus−T. Aman	780	0.009	3	5
264	Wheat−Sesame−Blackgram(Orchard)	760	0.009	3	3
265	Sweet Potato−B.Aman	740	0.009	6	6
266	Mustard−Boro−Sesbania	700	0.008	2	2
267	Potato−Boro−Vegetable	700	0.008	4	4
268	Soybean−Aus−Fallow	700	0.008	1	1
269	Sweet Potato−Jute−T. Aman	675	0.008	10	13
270	Maize−Groundnut	620	0.007	1	1
271	Millet(Cheena)−Jute−Fallow	620	0.007	2	2
272	Sesame+B.Aman−Blackgram	600	0.007	1	1
273	Tobacco−Maize−Vegetable	600	0.007	1	1
274	Tobacco−Sesbania	600	0.007	1	1
275	Wheat−Aus−Cotton	600	0.007	1	1
276	Groundnut−Sesame−Fallow	590	0.007	4	5
277	Potato−Boro−Jute	590	0.007	2	2
278	Wheat−Ginger/Turmeric	580	0.007	2	2
279	Sweet Potato−Vegetable−Fallow	540	0.006	5	9
280	Water Melon−B.Aman	535	0.006	3	3
281	Garlic−Fallow−Fallow	530	0.006	10	14
282	Onion−Maize−Fallow	520	0.006	4	4
283	Potato−Onion−T. Aman	510	0.006	2	2
284	Felon−Aus−Fallow	470	0.005	2	3
285	Grasspea−Mungbean−T. Aman	440	0.005	5	5
286	Boro−Maize−Fallow	410	0.005	2	2
287	Potato+Maize−B.Aman	410	0.005	2	3
288	Felon−Fallow−Fallow	380	0.004	3	4
289	Groundnut−Millet(Kaon)−Fallow	380	0.004	2	2
290	Chickpea−Aus−T. Aman	375	0.004	5	7
291	Potato−Sesame−Aus	360	0.004	4	4
292	Boro−Chilli−Fallow	350	0.004	1	1
293	Boro−Maize−Blackgram	350	0.004	1	1
294	Sesame−B.Aman	330	0.004	2	2
295	Garlic+Muskmelon−B.Aman	320	0.004	1	2
296	Garlic+WaterMelon−B.Aman	320	0.004	1	2
297	Mungbean−Jute−Fallow	300	0.004	6	8
298	Sesame−Jute−T. Aman	290	0.003	2	2
299	Chickpea−Jute−T. Aman	270	0.003	7	11
300	Grasspea−Aus−Blackgram	250	0.003	1	1
301	Musk Melon−B.Aman	215	0.003	2	5
302	Potato+Maize−Vegetable−T. Aman	210	0.002	2	2
303	Mustard−Maize−Jute	200	0.002	1	1
304	Vegetab−Onion−Jute−T. Aman	200	0.002	1	1
305	Mungbean−Jute−T. Aman	180	0.002	9	11

Table 2. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
306	Soybean−Jute−Fallow	140	0.002	2	2
307	Sunflower−Jute−Fallow	135	0.002	3	3
308	Mungbean−B.Aus+B.Aman	130	0.002	4	4
309	Musk Melon−Fallow−Fallow	125	0.001	5	5
310	Lentil−Mungbean−Jute−T. Aman	100	0.001	1	1
311	Mustard−Mungbean−Aus−T. Aman	100	0.001	1	1
312	Potato+S. gourd−M.bean−T. Aman	80	0.001	1	1
313	Tobacco−Mungbean−T. Aman	50	0.001	1	1
314	Tobacco−Mungbean−Vegetable	40	0.000	1	1
315	Mungbean−Aus−Fallow	20	0.000	1	1
316	Barley−Fallow−Fallow	15	0.000	1	2
	Others	64790	0.756	64	486
	Annual crops	243765	2.846	64	486
	Net cropped area of Bangladesh	8566500	100.000	64	486

In Bangladesh, 316 CPs were found which deserved to be included in the CP list of the study excluding the minor ones (Table 2). Boro-Fallow-T. Aman was the most dominant CP which occupied 26.92% of the NCA. Whereas the last CP was the Barley-Fallow-Fallow which occupied only 0.0002% of the NCA. There had been many more CPs, whose hectarages were quite low, were not considered in the list. Those CPs were kept in 'Other' category where only summation of all of their hectarages was considered. The most dominant CP, Boro-Fallow-T. Aman occupied significantly higher percentage of NCA than that of its next following CP, Boro-Fallow-Fallow which occupied less than half of the percentage of NCA of Boro-Fallow-T. Aman. The next three CPs were Fallow-Fallow-T. Aman, Boro-Aus-T. Aman and Fallow-Aus-T. Aman, respectively. These five CPs occupied 50.86% of the NCA. Interestingly the results unveiled that in these foremost five CPs, no other crop than rice was included. It indicated the dominancy of rice culture in Bangladesh. Sujatha *et al.* (2011) found similar dominancy of rice culture in Tamil Nadu in the neighbouring country, India. Boro and T. Aman contribute the large share in crop production. In T. Aman season, monsoon rain is plenty, however it is usually unreliable whereas in Boro season irrigation is comparatively reliable. Availability of water in these two seasons brought more area under rice cultivation. Hence Boro-Fallow-T. Aman became the most dominant CP of the country. T. Aman is usually cultivated in medium highland. Therefore, this CP is practiced in medium highland of the country. All other CPs including 'Other' category, that could be few hundreds, constituted the rest 49% of NCA. In Table 2, 'number of upazila' indicates the existence of a specific CP in total number of upazilas. The most dominant CP, Boro-Fallow-T. Aman was present in 426 upazilas out of 486. It was found that higher the percentage of NCA occupied by a CP greater the presence of the CP in different upazilas. In terms of area coverage some of the CPs mentioned in this study were very minor CPs, such as Boro-Fallow-Maize, Maize-Sesbania-Fallow etc. These two CPs were present in one upazila only with low area coverage.

In the earlier table, all the CPs were listed, however, in Table 3, CPs with rice exclusively was separated. There were 17 CPs containing exclusively rice crops. Foremost five of them were most dominant CPs, mentioned in earlier para. Twelve others may be considered as minor. Among these minors, in some CPs fishes were included in rainy season. In another CP, single T. Aman was cultivated in the orchard where fruit trees were still small. All these 17 CPs occupied 54.77% of the NCA. Thus rice exclusive CPs

Table 3. List of cropping patterns with rice exclusively and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Boro−Fallow−T. Aman	2306005	26.92	63	426
02	Boro−Fallow−Fallow	1139530	13.30	59	342
03	Fallow−Fallow−T. Aman	509480	5.95	36	162
04	Boro−Aus−T. Aman	209015	2.44	47	177
05	Fallow−Aus−T. Aman	193275	2.26	30	108
06	Boro−B.Aman	183070	2.14	32	113
07	Boro−Aus−Fallow	45865	0.54	34	71
08	Boro−Fish	31400	0.37	3	17
09	Fish−T. Aman	20400	0.24	3	8
10	Fallow−B.Aman	16360	0.19	15	29
11	Boro−Sesbania−T. Aman	14490	0.17	20	33
12	Boro−Sesbania−Fallow	9180	0.11	12	19
13	Boro−Fallow−T. Aman +Fish	5410	0.06	3	7
14	Fallow−B.Aus+B.Aman	3470	0.04	3	5
15	Fallow−Fallow−T. Aman +Fish	2200	0.03	2	2
16	Fallow−Aus−Fallow	1400	0.02	3	3
17	F−F−T. Aman (Orchard)	1000	0.01	1	1
	Total of exclusive rice area	4691550	54.77	-	-

Table 4. List of cropping patterns with Boro crop and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Boro−Fallow−T. Aman	2306005	26.92	63	426
02	Boro−Fallow−Fallow	1139530	13.30	59	342
03	Boro−Aus−T. Aman	209015	2.44	47	177
04	Mustard−Boro−T. Aman	184620	2.16	51	203
05	Boro−B.Aman	183070	2.14	32	113
06	Potato−Boro−T. Aman	180380	2.11	33	115
07	Mustard−Boro−Fallow	143130	1.67	37	112
08	Boro−Aus−Fallow	45865	0.54	34	71
09	Boro−Jute−T. Aman	40440	0.47	19	56
10	Mustard−Boro−B.Aman	36520	0.43	14	32
11	Boro−Fish	31400	0.37	3	17
12	Vegetable−Boro−T. Aman	21220	0.25	22	42
13	Potato−Boro−Fallow	19360	0.23	17	27
14	Mustard−Boro−Aus	18140	0.21	10	16
15	Boro−Jute−Fallow	16370	0.19	19	25
16	Boro−Sesbania−T. Aman	14490	0.17	20	33
17	Boro−Vegetable (Float/Norm)	13335	0.16	27	36
18	Boro−Fallow−Blackgram	13270	0.15	27	44
19	Boro−Sesbania−Fallow	9180	0.11	12	19
20	Boro−Vegetable−T. Aman	8660	0.10	9	16
21	Boro−Aus−Blackgram	8540	0.10	5	5
22	Mustard−Boro−Aus−T. Aman	7850	0.09	14	30
23	Potato−Boro−Aus	7420	0.09	4	6
24	Vegetable−Boro−Fallow	7100	0.08	9	10
25	Boro−Fallow−T. Aman +Fish	5410	0.06	3	7

Table 4. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
26	Grasspea−Boro−Fallow	4690	0.05	8	12
27	Chilli−Boro−Jute	3600	0.04	2	3
28	Potato−Boro−Aus−T. Aman	3140	0.04	5	9
29	Mustard−Boro−Jute	3000	0.04	5	7
30	Mustard−Boro−Jute−T. Aman	2980	0.03	7	13
31	Grasspea−Boro−B.Aman	2700	0.03	3	3
32	Tobacco−Boro−T. Aman	2300	0.03	3	4
33	Potato−Boro−Jute−T. Aman	2160	0.03	4	5
34	B.gram(Fodder)−Boro−B.Aman	2000	0.02	1	1
35	Grasspea−Boro−Aus	1800	0.02	1	1
36	Boro−Fallow−Maize	1500	0.02	1	1
37	Maize−Boro−T. Aman	1400	0.02	2	2
38	Vegetab−Boro−Aus−T. Aman	820	0.01	4	5
39	Vegetable−Boro−Jute	800	0.01	2	3
40	Mustard−Boro−Sesbania	700	0.01	2	2
41	Potato−Boro−Vegetable	700	0.01	4	4
42	Potato−Boro−Jute	590	0.01	2	2
43	Boro−Maize−Fallow	410	0.00	2	2
44	Boro−Chilli−Fallow	350	0.00	2	1
45	Boro−Maize−Blackgram	350	0.00	1	1
	Total Boro area	4706310	54.94	-	-

Table 5. List ofcropping patterns with T. Aman rice and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Boro−Fallow−T. Aman	2306005	26.919	63	426
02	Fallow−Fallow−T. Aman	509480	5.947	36	162
03	Boro−Aus−T. Aman	209015	2.440	47	177
04	Fallow−Aus−T. Aman	193275	2.256	30	108
05	Mustard−Boro−T. Aman	184620	2.155	51	203
06	Potato−Boro−T. Aman	180380	2.106	33	115
07	Wheat−Jute−T. Aman	147210	1.718	43	216
08	Grasspea−Fallow−T. Aman	108150	1.262	25	80
09	Maize−Fallow−T. Aman	101460	1.184	39	126
10	Wheat−Fallow−T. Aman	90910	1.061	39	100
11	Mungbean−Fallow−T. Aman	89650	1.047	22	70
12	Grasspea−Aus−T. Aman	81610	0.953	19	61
13	Vegetable−Fallow−T. Aman	74710	0.872	45	170
14	Onion−Jute−T. Aman	54185	0.633	39	102
15	Mungbean−Aus−T. Aman	53730	0.627	14	43
16	Chilli−Fallow−T. Aman	52995	0.619	45	146
17	Lentil−Jute−T. Aman	51875	0.606	34	96
18	Vegetable−Vegetable−T. Aman	51745	0.604	49	127
19	Potato−Maize−T. Aman	47690	0.557	19	68
20	Boro−Jute−T. Aman	40440	0.472	19	56
21	Felon−Fallow−T. Aman	37675	0.440	14	53
22	Mustard−Boro−B.Aman	36520	0.426	14	32
23	Wheat−Aus−T. Aman	36425	0.425	35	93

Table 5. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
24	Mustard−Jute−T. Aman	32740	0.382	29	64
25	Groundnut−Fallow−T. Aman	29210	0.341	23	60
26	Vegetable−Aus−T. Aman	28700	0.335	42	87
27	Water Melon−Fallow−T. Aman	28340	0.331	17	49
28	Potato−Jute−T. Aman	28310	0.330	36	95
29	Potato−B.Aman	23900	0.279	9	25
30	Soybean−Fallow−T. Aman	23670	0.276	5	10
31	Soybean−Aus−T. Aman	23170	0.270	5	8
32	Potato−Fallow−T. Aman	22715	0.265	34	108
33	Potato−Aus−T. Aman	22405	0.262	29	79
34	Wheat−Mungbean−T. Aman	21760	0.254	20	50
35	Maize−Jute−T. Aman	21325	0.249	18	38
36	Vegetable−Boro−T. Aman	21220	0.248	22	42
37	Fish−T. Aman	20400	0.238	3	8
38	Soybean−Jute−T. Aman	20000	0.233	4	6
39	Sweet Potato−Fallow−T. Aman	16990	0.198	31	103
40	Wheat−Maize−T. Aman	16320	0.191	9	14
41	Tobacco−Jute−T. Aman	15200	0.177	9	19
42	Mustard−Fallow−T. Aman	14870	0.174	33	84
43	Groundnut− Aus−T. Aman	14535	0.170	10	18
44	Boro−Sesbania−T. Aman	14490	0.169	20	33
45	Chilli−Aus−T. Aman	14240	0.166	21	38
46	Mustard−Aus−T. Aman	13790	0.161	30	52
47	Fallow−Jute−T. Aman	13620	0.159	18	32
48	Garlic−Jute−T. Aman	13090	0.153	38	78
49	Lentil−Fallow−T. Aman	12680	0.148	29	68
50	Potato−Vegetable−T. Aman	12620	0.147	30	59
51	Lentil−Sesame−T. Aman	12450	0.145	14	33
52	Fallow−Sesame−T. Aman	11640	0.136	13	20
53	Vegetable−Jute−T. Aman	11305	0.132	25	51
54	Lentil−Aus−T. Aman	11255	0.131	25	46
55	Wheat−Sesame−T. Aman	10650	0.124	15	33
56	Water Melon−Aus−T. Aman	10355	0.121	11	14
57	Grasspea−Jute−T. Aman	10300	0.120	25	43
58	Sesame−Fallow−T. Aman	9265	0.108	19	31
59	Felon−Aus−T. Aman	9245	0.108	7	16
60	Boro−Vegetable−T. Aman	8660	0.101	9	16
61	Mustard−Boro−Aus−T. Aman	7850	0.092	14	30
62	Tobacco−Maize−T. Aman	7470	0.087	5	12
63	Chilli−Jute−T. Aman	7250	0.085	20	35
64	Fallow−Vegetable−T. Aman	7130	0.083	16	29
65	Lentil−Mungbean−T. Aman	6955	0.081	11	22
66	Onion−Fallow−T. Aman	6380	0.074	32	64
67	Mustard−Maize−T. Aman	6310	0.074	9	19
68	Tobacco−Aus−T. Aman	6040	0.071	5	12
69	Boro−Fallow−T. Aman +Fish	5410	0.063	3	7
70	Tobacco−Fallow−T. Aman	5310	0.062	7	15

Table 5. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
71	Wheat−Vegetable−T. Aman	5205	0.061	15	25
72	Maize−Mungbean−T. Aman	4900	0.057	1	3
73	Mustard−Mungbean−T. Aman	4710	0.055	12	18
74	Chickpea−Fallow−T. Aman	4700	0.055	12	32
75	Coriander−Jute−T. Aman	4625	0.054	17	30
76	Vegetable−Maize−T. Aman	4500	0.053	9	15
77	Onion−Aus−T. Aman	4260	0.050	17	26
78	Wheat−Fallow−T. Aman (Orchard)	3700	0.043	1	2
79	Garlic−Fallow−T. Aman	3680	0.043	31	59
80	Mustard−Sesame−T. Aman	3360	0.039	12	15
81	Potato−Boro−Aus−T. Aman	3140	0.037	5	9
82	Onion−Sesame−T. Aman	3080	0.036	4	6
83	Maize−Maize−T. Aman	3070	0.036	6	8
84	Mustard−Boro−Jute−T. Aman	2980	0.035	7	13
85	Maize−Aus−T. Aman	2970	0.035	17	27
86	Lentil−Maize−T. Aman	2920	0.034	4	8
87	Potato−Groundnut−T. Aman	2720	0.032	3	5
88	Lentil−Vegetable−T. Aman	2660	0.031	11	11
89	Vegetable−Groundnut−T. Aman	2660	0.031	4	5
90	Garlic−Mungbean−T. Aman	2500	0.029	1	2
91	Garlic−Aus−T. Aman	2400	0.028	13	20
92	Millet(Kaon)−Fallow−T. Aman	2390	0.028	6	6
93	Musk Melon−Fallow−T. Aman	2310	0.027	10	23
94	Tobacco−Boro−T. Aman	2300	0.027	3	4
95	Fallow−Fallow−T. Aman +Fish	2200	0.026	2	2
96	Coriander−Fallow−T. Aman	2185	0.026	31	62
97	Potato−Boro−Jute−T. Aman	2160	0.025	4	5
98	Sweet Potato−Aus−T. Aman	2150	0.025	2	2
99	Sunflower−Fallow−T. Aman	2100	0.025	7	23
100	Potato−Sesame−T. Aman	2060	0.024	15	23
101	Pea−Fallow−T. Aman	1950	0.023	18	27
102	Blackgram−Jute−T. Aman	1900	0.022	11	14
103	Maize−Sesame−T. Aman	1835	0.021	6	9
104	Maize−Vegetable−T. Aman	1810	0.021	11	12
105	Grasspea−Sesame−T. Aman	1790	0.021	5	6
106	Blackgram−Aus−T. Aman	1735	0.020	10	13
107	Tobacco−Sesbania−T. Aman	1620	0.019	1	2
108	Groundnut−Jute−T. Aman	1530	0.018	7	13
109	Onion−Maize−T. Aman	1490	0.017	7	9
110	Chilli−Vegetable−T. Aman	1405	0.016	15	19
111	Maize−Boro−T. Aman	1400	0.016	2	2
112	Blackcumin−Jute−T. Aman	1260	0.015	6	11
113	Sesame−Aus−T. Aman	1180	0.014	4	5
114	Potato−Mungbean−T. Aman	1140	0.013	11	13
115	Fallow−Fallow−T. Aman (Orchard)	1000	0.012	1	1
116	Coriander−Sesame− T.Aman	845	0.010	5	5
117	Vegetable−Boro−Aus− T.Aman	820	0.010	4	5
118	Potato+Sweet gourd−Aus− T.Aman	780	0.009	3	5

Table 5. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
119	Sweet Potato−Jute− T.Aman	675	0.008	10	13
120	Potato−Onion− T.Aman	510	0.006	2	2
121	Grasspea−Mungbean− T.Aman	440	0.005	5	5
122	Chickpea−Aus−T. Aman	375	0.004	5	7
123	Sesame−Jute− T.Aman	290	0.003	2	2
124	Chickpea−Jute−T. Aman	270	0.003	7	11
125	Potato+Maize−Vegetable− T.Aman	210	0.002	2	2
126	Vegetable−Onion−Jute− T.Aman	200	0.002	1	1
127	Mungbean−Jute− T.Aman	180	0.002	9	11
128	Lentil−Mungbean−Jute− T.Aman	100	0.001	1	1
129	Mustard−Mungbean−Aus− T.Aman	100	0.001	1	1
130	Potato+S. gourd−M.bean− T.Aman	80	0.001	1	1
131	Tobacco−Mungbean− T.Aman	50	0.001	1	1
	Total of T. Aman	5574860	65.077	-	-

Table 6. List ofcropping patterns with B. Aman rice and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Boro−B. Aman	183070	2.14	32	113
02	Mustard−Boro−B. Aman	36520	0.43	14	32
03	Potato−B. Aman	23900	0.28	9	25
04	Grasspea−B. Aman	21480	0.25	21	52
05	Mustard−B. Aman	17210	0.20	12	24
06	Fallow−B. Aman	16360	0.19	15	29
07	Wheat−B. Aman	13835	0.16	16	32
08	Onion−B. Aman	10905	0.13	14	27
09	Garlic−B. Aman	10850	0.13	15	21
10	Chilli−B. Aman	9120	0.11	10	23
11	Blackgram−B. Aman	7625	0.09	11	24
12	Lentil−B. Aman	6550	0.08	16	30
13	Soybean−B. Aman	5650	0.07	4	4
14	Vegetable−B. Aman	5200	0.06	9	17
15	Maize−B. Aman	5030	0.06	10	15
16	Fallow−B. Aus+B. Aman	3470	0.04	3	5
17	Groundnut−B. Aman	2820	0.03	5	7
18	Fallow−Sesame+B. Aman	2750	0.03	5	7
19	Grasspea−Boro−B. Aman	2700	0.03	3	3
20	Pea−B. Aman	2620	0.03	11	16
21	Onion−Sesame+B. Aman	2100	0.02	2	3
22	B.gram(Fodder)−Boro−B.Aman	2000	0.02	1	1
23	Grasspea−Sesame+B. Aman	1800	0.02	2	2
24	Mustard−B.Aus+B. Aman	1780	0.02	4	4
25	Mustard−Sesame+B. Aman	1650	0.02	3	4
26	Grasspea−B.Aus+B. Aman	1580	0.02	6	8
27	Coriander−B. Aman	1480	0.02	11	1
28	Lentil−Sesame+B. Aman	980	0.01	1	1
29	Sweet Potato−B. Aman	740	0.01	6	1
30	Sesame+B. Aman−Blackgram	600	0.01	1	3
31	Water Melon−B. Aman	535	0.01	3	2

Table 6. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
32	Potato+Maize−B. Aman	410	0.00	2	3
33	Sesame−B. Aman	330	0.00	2	2
34	Garlic+Muskmelon−B. Aman	320	0.00	1	2
35	Garlic+Water Melon−B. Aman	320	0.00	1	2
36	Musk Melon−B. Aman	215	0.00	2	5
37	Mungbean−B. Aus+B. Aman	130	0.00	4	4
	Total of B. Aman	404635	4.72	-	-

Table 7. List of cropping patterns with Aus rice and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Boro−Aus−T. Aman	209015	2.44	47	177
02	Fallow−Aus−T. Aman	193275	2.26	30	108
03	Grasspea−Aus−T. Aman	81610	0.95	19	61
04	Mungbean−Aus−T. Aman	53730	0.63	14	43
05	Boro−Aus−Fallow	45865	0.54	34	71
06	Wheat−Aus−T. Aman	36425	0.43	35	93
07	Vegetable−Aus−T. Aman	28700	0.34	42	87
08	Soybean−Aus−T. Aman	23170	0.27	5	8
09	Potato−Aus−T. Aman	22405	0.26	29	79
10	Mustard−Boro−Aus	18140	0.21	10	16
11	Wheat−Aus−Fallow	16200	0.19	17	26
12	Vegetable−Aus−Fallow	15940	0.19	23	41
13	Groundnut− Aus−T. Aman	14535	0.17	10	18
14	Chilli−Aus−T. Aman	14240	0.17	21	38
15	Mustard−Aus−T. Aman	13790	0.16	30	52
16	Maize−Aus−Fallow	13615	0.16	14	18
17	Wheat−Aus−Blackgram	13000	0.15	6	8
18	Fallow−Aus+Non-rice (*zhum*)	11900	0.14	3	20
19	Lentil−Aus−T. Aman	11255	0.13	25	46
20	Water Melon−Aus−T. Aman	10355	0.12	11	14
21	Felon−Aus−T. Aman	9245	0.11	7	16
22	Onion−Aus−Fallow	8705	0.10	12	17
23	Boro−Aus−Blackgram	8540	0.10	5	5
24	Mustard−Boro−Aus−T. Aman	7850	0.09	14	30
25	Chilli−Aus−Fallow	7565	0.09	14	27
26	Potato−Boro−Aus	7420	0.09	4	6
27	Tobacco−Aus−T. Aman	6040	0.07	5	12
28	Mustard−Aus−Fallow	4935	0.06	15	22
29	Lentil−Aus−Fallow	4570	0.05	11	15
30	Potato−Maize−Aus	4300	0.05	3	4
31	Onion−Aus−T. Aman	4260	0.05	17	26
32	Fallow−B. Aus+B. Aman	3470	0.04	3	5
33	Vegetable−Onion−Aus	3200	0.04	3	3
34	Tobacco−Aus−Fallow	3180	0.04	5	10
35	Potato−Boro−Aus−T. Aman	3140	0.04	5	9
36	Maize−Aus−Vegetable	3000	0.04	3	4
37	Maize−Aus−T. Aman	2970	0.03	17	27

Table 7. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
38	Garlic−Aus−T. Aman	2400	0.03	13	20
39	Potato−Aus−Fallow	2310	0.03	13	16
40	Sweet Potato−Aus−T. Aman	2150	0.03	2	2
41	Mustard−Aus−Blackgram	1900	0.02	2	2
42	Wheat−Aus−Onion	1900	0.02	1	1
43	Onion−Aus−Blackgram	1810	0.02	5	6
44	Grasspea−Boro−Aus	1800	0.02	1	1
45	Mustard−B. Aus+B. Aman	1780	0.02	4	4
46	Blackgram−Aus−T. Aman	1735	0.02	10	13
47	Vegetable−Aus−Blackgram	1610	0.02	4	4
48	Grasspea−B.Aus+B. Aman	1580	0.02	6	8
49	Groundnut− Aus−Fallow	1550	0.02	5	5
50	Garlic−Aus−Fallow	1450	0.02	12	15
51	Fallow−Aus−Fallow	1400	0.02	3	3
52	Maize−Aus−Blackgram	1370	0.02	3	3
53	Cotton−Aus−Fallow	1330	0.02	3	3
54	Pea−Aus−Vegetable	1310	0.02	7	8
55	Sesame−Aus−Fallow	1190	0.01	3	4
56	Sesame−Aus−T. Aman	1180	0.01	4	5
57	Potato−Maize−Aus−Vegetab	1030	0.01	3	3
58	Potato−Sweet gourd−Aus	910	0.01	6	8
59	Vegetable−Boro−Aus−T. Aman	820	0.01	4	5
60	Potato+S.gourd−Aus−T. Aman	780	0.01	3	5
61	Soybean−Aus−Fallow	700	0.01	1	1
62	Wheat−Aus−Cotton	600	0.01	1	1
63	Felon−Aus−Fallow	470	0.01	2	3
64	Chickpea−Aus−T. Aman	375	0.00	5	7
65	Potato−Sesame−Aus	360	0.00	4	4
66	Grasspea−Aus−Blackgram	250	0.00	1	1
67	Mungbean−B. Aus+B. Aman	130	0.00	4	4
68	Must.−M.bean−Aus−T.Aman	100	0.00	1	1
69	Mungbean−Aus−Fallow	20	0.00	1	1
	Total of Aus	977855	11.41	-	-

Table 8. List of cropping patterns exclusively with non-rice crops and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Vegetab−Vegetab−Vegetab	143270	1.672	61	283
02	Vegetable−Vegetable−F	63935	0.746	59	168
03	Wheat−Jute−Fallow	48700	0.568	32	82
04	Onion−Jute−Fallow	45200	0.528	29	67
05	Lentil−Jute−Fallow	32360	0.378	27	67
06	Vegetable−Fallow−Fallow	31115	0.363	35	84
07	Maize−Jute−Fallow	21425	0.250	19	33
08	Grasspea−Jute−Fallow	21000	0.245	21	39
09	Mustard−Jute−Fallow	17180	0.201	16	35
10	Groundnut−Fallow−Fallow	16485	0.192	35	76

Table 8. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
11	Potato−Jute−Fallow	14515	0.169	25	53
12	Garlic−Jute−Fallow	13475	0.157	26	48
13	Chilli−Jute−Fallow	13260	0.155	22	54
14	Vegetable−Jute−Fallow	13185	0.154	26	47
15	Maize−Fallow−Fallow	12920	0.151	22	38
16	Onion−Vegtable−Vegetable	11735	0.137	39	87
17	Potato−Sesbania	10770	0.126	05	15
18	Potato−Maize−Fallow	9640	0.113	10	16
19	Chilli−Fallow−Fallow	9265	0.108	40	66
20	Chilli−Vegetable−Fallow	8810	0.103	44	104
21	Fallow−Fallow−Blackgram	8695	0.102	34	59
22	Sweet Potato−Fallow−Fallow	7980	0.093	37	98
23	Coriander−Jute−Fallow	7390	0.086	15	25
24	Maize−Vegetable−Fallow	7120	0.083	14	19
25	Lentil−Vegetable−Vegetable	6330	0.074	19	30
26	Wheat−Vegetable−Vegetable	6100	0.071	16	21
27	Garlic−Vegetable−Vegetable	4385	0.051	27	68
28	Tobacco−Jute−Fallow	4050	0.047	04	8
29	Wheat−Jute−Blackgram	3910	0.046	07	9
30	Wheat−Fallow−Fallow	3810	0.044	06	8
31	Wheat−Chilli−Fallow	3780	0.044	07	9
32	Maize−Maize−Fallow	3720	0.043	03	5
33	Lentil−Sesame−Fallow	3680	0.043	15	20
34	Maize−Fallow−Blackgram	3600	0.042	04	4
35	Vegetable−Fallow−Blackgram	3525	0.041	16	33
36	Sweet Potato−Jute−Fallow	3380	0.039	13	21
37	Coriander−Fallow−Fallow	3175	0.037	41	64
38	Wheat−Maize−Fallow	3070	0.036	02	4
39	Sesame−Fallow−Blackgram	3060	0.036	06	10
40	Wheat−Mungbean−Fallow	2875	0.034	05	7
41	Lentil−F−F (Orchard)	2780	0.032	03	5
42	Soybean−Fallow−Fallow	2710	0.032	03	4
43	Blackgram−Jute−Fallow	2295	0.027	12	16
44	Grasspea−Fallow−Fallow	2295	0.027	09	11
45	Potato−Maize−Vegetable	2190	0.026	04	4
46	Vegetable−Maize−Fallow	2180	0.025	06	7
47	Wheat−M.bean−F(Orchard)	2150	0.025	02	3
48	Pea−Jute−Fallow	2100	0.025	10	15
49	Coriander−Vegetable−Fallow	2090	0.024	20	29
50	Potato−Chilli−Fallow	2070	0.024	10	17
51	Wheat−Maize−Vegetable	2000	0.023	02	2
52	Potato−Sesame−Fallow	1930	0.023	06	10
53	Mustard−Jute−Vegetable	1900	0.022	03	5
54	Blackcumin−Jute−Fallow	1840	0.021	06	12
55	Millet(Kaon)+Sesame−Fallow	1810	0.021	05	7
56	Grasspea−Sesbania−Fallow	1780	0.021	04	4
57	Maize−Sesame−Fallow	1580	0.018	06	8

Table 8. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
58	Wheat−Sesame−Fallow	1550	0.018	07	8
59	Tobacco−Vegetab−Vegetab	1500	0.018	01	1
60	Vegetab−Jute−Vegetable	1450	0.017	05	5
61	Grasspea−Sesame−Fallow	1330	0.016	07	10
62	G.nut−Fallow−Blackgram	1320	0.015	03	3
63	Wheat−Jute−Vegetable	1320	0.015	06	6
64	Onion−Sesame−Fallow	1270	0.015	08	9
65	Water Melon−Fallow−Fallow	1165	0.014	09	12
66	Pea−Vegetable−Fallow	1160	0.014	04	5
67	Potato−Groundnut	1110	0.013	05	8
68	Tobacco−Fallow−Fallow	1045	0.012	05	8
69	Maize−Sesbania−Fallow	1000	0.012	01	1
70	Maize−Mungbean−Vegetable	950	0.011	03	3
71	Millet (Cheena)−F−F	935	0.011	05	6
72	Wheat−Fallow−Blackgram	900	0.011	01	1
73	Mustard−Fallow−Fallow	895	0.010	09	13
74	Wheat−Sesame−B.gram(Orchard)	760	0.009	03	3
75	Maize−Groundnut	620	0.007	01	1
76	Millet(Cheena)−Jute−Fallow	620	0.007	02	2
77	Tobacco−Maize−Vegetable	600	0.007	01	1
78	Tobacco−Sesbania	600	0.007	01	1
79	Groundnut−Sesame−Fallow	590	0.007	04	5
80	Wheat−Ginger/Turmeric	580	0.007	02	2
81	Sweet Potato−Vegetable−Fallow	540	0.006	05	9
82	Garlic−Fallow−Fallow	530	0.006	10	14
83	Onion−Maize−Fallow	520	0.006	04	4
84	Felon−Fallow−Fallow	380	0.004	03	4
85	Groundnut−Millet(Kaon)−F	380	0.004	02	2
86	Mungbean−Jute−Fallow	300	0.004	06	8
87	Mustard−Maize−Jute	200	0.002	01	1
88	Soybean−Jute−Fallow	140	0.002	02	2
89	Sunflower−Jute−Fallow	135	0.002	03	3
90	Muskmelon−Fallow−Fallow	125	0.001	05	5
91	Tobacco−Mungbean−Vegetable	40	0.000	01	1
92	Barley−Fallow−Fallow	15	0.000	01	2
	Total of exclusive non-rice area	714155	8.337	-	-

Table 9. List of wheat-based cropping patterns and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Wheat−Jute−T. Aman	147210	1.72	43	216
02	Wheat−Fallow−T. Aman	90910	1.06	39	100
03	Wheat−Jute−Fallow	48700	0.57	32	82
04	Wheat−Aus−T. Aman	36425	0.43	35	93
05	Wheat−Mungbean−T. Aman	21760	0.25	20	50
06	Wheat−Maize−T. Aman	16320	0.19	9	14
07	Wheat−Aus−Fallow	16200	0.19	17	26
08	Wheat−B. Aman	13835	0.16	16	32
09	Wheat−Aus−Blackgram	13000	0.15	6	8

Table 9. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
10	Wheat−Sesame−T. Aman	10650	0.12	15	33
11	Wheat−Vegetable−Vegetable	6100	0.07	16	21
12	Wheat−Vegetable−T. Aman	5205	0.06	15	25
13	Wheat−Jute−Blackgram	3910	0.05	7	9
14	Wheat−Fallow−Fallow	3810	0.04	6	8
15	Wheat−Chilli−Fallow	3780	0.04	7	9
16	Wheat−F−T. Aman(Orchard)	3700	0.04	1	2
17	Wheat−Maize−Fallow	3070	0.04	2	4
18	Wheat−Mungbean−Fallow	2875	0.03	5	7
19	Wheat−Mungbean−F (Orchard)	2150	0.03	2	3
20	Wheat−Maize−Vegetable	2000	0.02	2	2
21	Wheat−Aus−Onion	1900	0.02	1	1
22	Wheat−Sesame−Fallow	1550	0.02	7	8
23	Wheat−Jute−Vegetable	1320	0.02	6	6
24	Wheat−Fallow−Blackgram	900	0.01	1	1
25	Wheat−Sesame−B.gram(Orchard)	760	0.01	3	3
26	Wheat−Aus−Cotton	600	0.01	1	1
27	Wheat−Ginger/Turmeric	580	0.01	2	2
	Total of wheat	459220	5.36	-	-

Table 10. List of Maize-based cropping patterns and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Maize−Fallow−T. Aman	101460	1.18	39	126
02	Potato−Maize−T. Aman	47690	0.56	19	68
03	Maize−Jute−Fallow	21425	0.25	19	33
04	Maize−Jute−T. Aman	21325	0.25	18	38
05	Wheat−Maize−T. Aman	16320	0.19	9	14
06	Maize−Aus−Fallow	13615	0.16	14	18
07	Maize−Fallow−Fallow	12920	0.15	22	38
08	Potato−Maize−Fallow	9640	0.11	10	16
09	Tobacco−Maize−T. Aman	7470	0.09	5	12
10	Maize−Vegetable−Fallow	7120	0.08	14	19
11	Mustard−Maize−T. Aman	6310	0.07	9	19
12	Maize−B. Aman	5030	0.06	10	15
13	Maize−Mungbean−T. Aman	4900	0.06	1	3
14	Vegetable−Maize−T. Aman	4500	0.05	9	15
15	Potato−Maize−Aus	4300	0.05	3	4
16	Maize−Maize−Fallow	3720	0.04	3	5
17	Maize−Fallow−Blackgram	3600	0.04	4	4
18	Maize−Maize−T. Aman	3070	0.04	6	
19	Wheat−Maize−Fallow	3070	0.04	2	4
20	Maize−Aus−Vegetable	3000	0.04	3	4
21	Maize−Aus−T. Aman	2970	0.03	17	27
22	Lentil−Maize−T. Aman	2920	0.03	4	8
23	Potato−Maize−Vegetable	2190	0.03	4	4
24	Vegetable−Maize−Fallow	2180	0.03	6	7
25	Wheat−Maize−Vegetable	2000	0.02	2	2

Table 10. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
26	Maize−Sesame−T. Aman	1835	0.02	6	9
27	Maize−Vegetable−T. Aman	1810	0.02	11	12
28	Maize−Sesame−Fallow	1580	0.02	6	8
29	Boro−Fallow−Maize	1500	0.02	1	1
30	Onion−Maize−T. Aman	1490	0.02	7	9
31	Maize−Boro−T. Aman	1400	0.02	2	2
32	Maize−Aus−Blackgram	1370	0.02	3	3
33	Potato−Maize−Aus−Vegetab	1030	0.01	3	3
34	Maize−Sesbania−Fallow	1000	0.01	1	1
35	Maize−Mungbean−Vegetable	950	0.01	3	3
36	Maize−Groundnut	620	0.01	1	1
37	Tobacco−Maize−Vegetable	600	0.01	1	1
38	Onion−Maize−Fallow	520	0.01	4	4
39	Boro−Maize−Fallow	410	0.00	2	2
40	Potato+Maize−B. Aman	410	0.00	2	3
41	Boro−Maize−Blackgram	350	0.00	1	1
42	Potato+Maize−Veg−T.Aman	210	0.00	2	2
43	Mustard−Maize−Jute	200	0.00	1	1
	Total of maize	330030	3.85	-	-

Table 11. List of cropping patterns with tuber crops and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Potato−Boro−T. Aman	180380	2.11	33	115
02	Potato−Maize−T. Aman	47690	0.56	19	68
03	Potato−Jute−T. Aman	28310	0.33	36	95
04	Potato−B. Aman	23900	0.28	9	25
05	Potato−Fallow−T. Aman	22715	0.27	34	108
06	Potato−Aus−T. Aman	22405	0.26	29	79
07	Potato−Boro−Fallow	19360	0.23	17	27
08	S.Potato−Fallow−T. Aman	16990	0.20	31	103
09	Potato−Jute−Fallow	14515	0.17	25	53
10	Potato−Vegetable−T. Aman	12620	0.15	30	59
11	Potato−Sesbania	10770	0.13	5	15
12	Potato−Maize−Fallow	9640	0.11	10	16
13	Sweet Potato−Fallow−Fallow	7980	0.09	37	98
14	Potato−Boro−Aus	7420	0.09	4	6
15	Potato−Maize−Aus	4300	0.05	3	4
16	Sweet Potato−Jute−Fallow	3380	0.04	13	21
17	Potato−Boro−Aus−T. Aman	3140	0.04	5	9
18	Potato−Groundnut−T. Aman	2720	0.03	3	5
19	Potato−Aus−Fallow	2310	0.03	13	16
20	Potato−Maize−Vegetable	2190	0.03	4	4
21	Potato−Boro−Jute−T. Aman	2160	0.03	4	5
22	S.Potato−Aus−T. Aman	2150	0.03	2	2
23	Potato−Chilli−Fallow	2070	0.02	10	17
24	Potato−Sesame−T. Aman	2060	0.02	15	23
25	Potato−Sesame−Fallow	1930	0.02	6	10

Table 11. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
26	Potato−Mungbean−T. Aman	1140	0.01	11	13
27	Potato−Groundnut	1110	0.01	5	8
28	Potato−Maize−Aus−Vegetable	1030	0.01	3	3
29	Potato−Sweet gourd−Aus	910	0.01	6	8
30	Potato+S. gourd−Aus−T. Aman	780	0.01	3	5
31	Sweet Potato−B. Aman	740	0.01	6	6
32	Potato−Boro−Vegetable	700	0.01	4	4
33	Sweet Potato−Jute−T. Aman	675	0.01	10	13
34	Potato−Boro−Jute	590	0.01	2	2
35	Sweet Potato−Vegetable−Fallow	540	0.01	5	9
36	Potato−Onion−T. Aman	510	0.01	2	2
37	Potato+Maize−B. Aman	410	0.00	2	3
38	Potato−Sesame−Aus	360	0.00	4	4
39	Potato+Maize−Vegetab−T. Aman	210	0.00	2	2
40	Potato+S.gourd−Mung−T Aman	80	0.00	1	1
	Total of tuber crops	462890	5.40	-	-

not only indicated their dominance, but also their combination diversity among themselves in growing seasons round the year. Because of increasing projected population importance of rice will increase furthermore in future (Kabir *et al.*, 2015). In this table, it was noticeable that only single rice containing CPs occupied large area of the country. The most dominant of them was Boro-Fallow-Fallow followed by Fallow-Fallow-T. Aman. These two CPs occupied 13.3% and 5.95%of the NCA, respectively and together occupied 19.25% of the NCA. Boro-Fallow-Fallow is practiced in medium lowland to very lowland where inclusion of other crop is difficult. However, some of these areas, DWR can be included after Boro or short duration mustard can be included before Boro. Farmers are reluctant to cultivate DWR because of its low yield. However, short duration mustard can be included in it even with zero tillage. Single T. Aman CP is practiced in constraints soils e.g., in drought prone Barind tract or in tidal wetland. Soil in Barind tract quickly dries up in Rabi season and Rabi crop cultivation is not possible if there is no irrigation facility. In tidal saline wetland, salinity restricts other crops to be included in dry season. In nonsaline tidal wetland, in many areas water recedes late, however inundation by tidal water starts early. So Rabi crop is difficult to grow. Some of these CPs, may possess scope of improvement in suitable areas by including non-rice crops in it and hence increase intensity and diversity. For example, short duration mustard can be included in Boro-Fallow-Fallow CP. Similarly short duration Rabi crops may be included in Fallow-Fallow-T. Aman CP.

Among the rice growing seasons, Boro is the most favourable where irrigation is made ensured. Though the area coverage of Boro stands second, next to T. Aman, it produces the highest amount of rice. Boro rice is cultivated in about 4.7 million hectares of land and Boro containing CPs occupied about 55% of NCA (Table 4). The highest Boro containing CP was Boro-Fallow- T. Aman with 26.92% of NCA. The area under this CP was about 2.3 million hectares. This CP was followed by Boro-Fallow-Fallow and then Boro-Aus- T. Aman with 13.3% and 2.44 % of NCA. There were also some minor CPs with Boro e.g., Blackgram (Fodder)-Boro-B. Aman, Grasspea-Boro-Aus etc.

In traditional agriculture, Aman was considered as the most suited season for rice culture in Bangladesh. Before the development of modern irrigation system it was only the major season for rice culture. Rice requires enough water for successful culture. Monsoon rain provides Aman rice with enough water. However, unlike Boro, it is practically rainfed

and rainfall in its growing period is unreliable. During this time other sources of water like flood, tidal water etc may be available and are adjusted to its culture. Because of different growing environments of Aman rice there are different types of Aman of which transplanted and broadcasted are the common types. Because of these varied growing environments, Aman grows in many CPs. Table 5 presents T. Aman containing CPs. There were 131 CPs containing T. Aman in it. Boro-Fallow-T. Aman was the most dominant CP accounting for about 26.92% of the NCA. The following CPs were Fallow-Fallow-T. Aman, Boro-Aus-T. Aman, Fallow-Aus-T. Aman accounting for about 5.95%, 2.44% and 2.26% of the NCA, respectively. There were some minor CPs in terms of area coverage containing T. Aman in them. Such as Lentil-Mungbean-Jute-T. Aman, Mustard-Mungbean-Aus-T. Aman, Potato Sweet gourd-Mungbean-T. Aman, Tobacco-Mungbean-T. Aman etc and each of which accounts for about 0.001% of NCA, separately.

Broadcast Aman is suited well in flood prone areas. Table 6 presents CPs with B. Aman. There were 37 CPs containing B. Aman. The most dominant CP was Boro-B. Aman covering about 2.14% of NCA. This was followed by Mustard-Boro-B. Aman, Potato-Fallow-B. Aman etc. Some B. Aman rice is cultivated as mixed crop with B. Aus or sesame where after harvest of Aus or sesame puddling is not possible and hence T. Aman cultivation is not possible. So, broadcast Aus and Aman are sown together. In some B. Aman-based CPs scavenging fish cultivation may be included in some pocket area in future to utilize the flood water.

Currently, Aus is basically cultured as transplanted crop. In the table, Aus means T. Aus and in case of broadcast Aus it is denoted by B. Aus. There were 69 CPs containing Aus in it (Table 7). These CPs have the coverage of 11.41% of NCA. The most dominant CP containing Aus in it was Boro-Aus-T. Aman which covered 2.44% of NCA. This CP was followed by Fallow-Aus- T. Aman and then Grasspea-Aus- T. Aman.

Rice and other cereal containing CPs occupied huge areas of the country (Tables 2 and 3). Contrarily there were other CPs they excluded rice in it. Ninety-two CPs were found excluding rice (Table 8). These CPs were minor considering their area coverage and altogether they contributed to 8.34% of NCA. Many nonrice crops are cultivated in our country. Thus their combination in CPs gave rise to a big number of list of CPs. Because of some special features, these CPs were developed without rice in it. As for example, in the vicinity of a city, vegetable are more profitable, so farmer grows vegetable round the year. Similarly in some charlands only groundnut is cultivated successfully and gives rise to a Groundnut-Fallow-Fallow CP.

There were 27 wheat-based CPs which occupying 5.36% of NCA (Table 9). Wheat-Jute-T. Aman was the most dominant CP followed by Wheat-Fallow-T. Aman with a NCA of 1.72% and 1.06%, respectively.

In Bangladesh, maize is cultivated in Rabi and Kharif-I seasons. In recent years, area and production of maize increased considerably. Table 10 presents maize-based CPs. The most dominant CP with maize was Maize-Fallow-T. Aman, which occupied 1.18% of NCA. Maize-based CPs altogether covered 3.85% of NCA.

Potato and sweet potato are major tuber crops. These tuber crops occupied 5.4% of the NCA (Table 11). There were 40 CPs containing potato or sweet potato. Potato-Boro-T. Aman was the most dominant CP which was followed by Potato-Maize-T. Aman CP. These CPs occupied 2.11% and 0.56% of the NCA, respectively.

In Bangladesh there are several edible oil seed crops. Mustard is the major one. Others are very minor. Mustard containing CPs are listed in Table 12. There was 24 mustard containing CPs. All these 24 CPs occupied 520,470 hectares of land accounting for over 6% of the NCA. Among those, the most dominant CP was Mustard-Boro-T. Aman and it was followed by Mustard-Boro-Fallow which occupied 184,620 and 143,130 hectares of land and found in 203 and 112 upazilas, respectively.

Table 12. List of mustard-based cropping patterns and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Mustard−Boro−T. Aman	184620	2.16	51	203
02	Mustard−Boro−Fallow	143130	1.67	37	112
03	Mustard−Boro−B. Aman	36520	0.43	14	32
04	Mustard−Jute−T. Aman	32740	0.38	29	64
05	Mustard−Boro−Aus	18140	0.21	10	16
06	Mustard−B. Aman	17210	0.20	12	24
07	Mustard−Jute−Fallow	17180	0.20	16	35
08	Mustard−Fallow−T. Aman	14870	0.17	33	84
09	Mustard−Aus−T. Aman	13790	0.16	30	52
10	Mustard−Boro−Aus−T. Aman	7850	0.09	14	30
11	Mustard−Maize−T. Aman	6310	0.07	9	19
12	Mustard−Aus−Fallow	4935	0.06	15	22
13	Mustard−M.bean−T. Aman	4710	0.05	12	18
14	Mustard−Sesame−T. Aman	3360	0.04	12	15
15	Mustard−Boro−Jute	3000	0.04	5	7
16	Mustard−Boro−Jute−T. Aman	2980	0.03	7	13
17	Mustard−Aus−Blackgram	1900	0.02	2	2
18	Mustard−Jute−Vegetable	1900	0.02	3	5
19	Mustard−B. Aus+B. Aman	1780	0.02	4	4
20	Mustard−Sesame+B. Aman	1650	0.02	3	4
21	Mustard−Fallow−Fallow	895	0.01	9	13
22	Mustard−Boro−Sesbania	700	0.01	2	2
23	Mustard−Maize−Jute	200	0.00	1	1
24	Mustard−M.bean−Aus−T.Aman	100	0.00	1	1
	Total mustard	520470	6.08	-	-

They occupied 2.16% and 1.67% of the NCA. Mustard containing other CPs neither occupied large area nor showed their presence in greater number of upazilas. Mustard accompanied in these CPs with different rice, maize, jute, mungbean, sesame etc.

There are other edible oil seed crops, which are minor in terms of area coverage. These are sesame, groundnut, soybean, sunflower etc. There were 52 CPs containing minor edible oil seed crops (Table 13). The most dominant CP was Groundnut-Fallow-T. Aman followed by Soybean-Fallow-T. Aman. These CPs occupied only 0.341% and 0.276% of the NCA, respectively. The CP, Groundnut-Fallow-Fallow had low coverage but were present comparatively higher number of 76 upazilas. All these CPs, though occupied few areas (2.81% of NCA), perhaps were well fitted to suitable ecosystems in pocket areas.

Grasspea, mungbean, lentil, blackgram, field pea, felon are common pulses of Bangladesh. Most of the pulses are grown in Rabi season. Mungbean is grown in Kharif-I and blackgram is in Kharif-II seasons. There were 83 CPs containing pulses (Table 14). Pulses accompanied in these CPs with different rices, cereals, jute, oil crops, tuber crops. All these 83 CPs together occupied 8.78% of the NCA. Among those, the most dominant CP was Grasspea-Fallow-T. Aman. This CP was followed by Mungbean-Fallow- T. Aman. The corresponding coverages of these two patterns were 108,150 and 89,650 hectares found in 80 and 70 upazilas, respectively. These CPs occupied 1.26% and 1.06% of the NCA. Pulse containing other CPs neither occupied large area nor were present in large number of upazilas. Pulses containing CPs altogether covered 8.78% of the NCA.

In Bangladesh there are several fibre crops. Jute is the major one. It grows in Kharif-I season. There were 56 jute containing CPs (Table 15). These 56 CPs occupied 9.09% of the NCA. Among those, the most dominant CP was Wheat-Jute-T. Aman and it was followed by Onion-Jute-T. Aman which occupied 147,210 and 54,185 hectares of land and were found in 216 and 102 upazilas, respectively. These CPs occupied separately 1.72% and 0.63% of the NCA. Jute containing other CPs neither occupied large area nor were present in large number of upazilas. Jute accompanied in these CPs with different rices, mungbean, sesame etc. Jute containing CPs usually contained Rabi or Boro crops before jute and T. Aman and fallow after jute.

CP with tobacco was cultivated in about 49,000 hectares of land (Table 16). There were 14 tobacco containing CPs and all of these together occupied 0.572% of NCA. The most dominant CP with tobacco was Tobacco-Jute-T. Aman which was followed by Tobacco-Maize-T. Aman. Tobacco was cultivated only in 12 districts in three to four clusters viz, Kushtia, Jhenaidaha, Meherpur, Lalmonirhat, Rangpur, Nilphamari, Rangamati, Bandarban, Khagrachhari, Coxsbazaar and Manikganj.

Table 13. List of cropping pattern with minor oil crops and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
1	Groundnut–Fallow–T. Aman	29210	0.341	23	60
2	Soybean–Fallow–T. Aman	23670	0.276	5	10
3	Soybean–Aus–T. Aman	23170	0.270	5	8
4	Soybean–Jute–T. Aman	20000	0.233	4	6
5	Groundnut–Fallow–Fallow	16485	0.192	35	76
6	Groundnut– Aus–T. Aman	14535	0.170	10	18
7	Lentil–Sesame–T. Aman	12450	0.145	14	33
8	Fallow–Sesame–T. Aman	11640	0.136	13	20
9	Wheat–Sesame–T. Aman	10650	0.124	15	33
10	Sesame–Fallow–T. Aman	9265	0.108	19	31
11	Soybean–B. Aman	5650	0.066	4	4
12	Lentil–Sesame–Fallow	3680	0.043	15	20
13	Mustard–Sesame–T. Aman	3360	0.039	12	15
14	Onion–Sesame–T. Aman	3080	0.036	4	6
15	Sesame–Fallow–Blackgram	3060	0.036	6	10
16	Groundnut–B. Aman	2820	0.033	5	7
17	Fallow–Sesame+B. Aman	2750	0.032	5	7
18	Potato–Groundnut–T. Aman	2720	0.032	3	5
19	Soybean–Fallow–Fallow	2710	0.032	3	4
20	Vegetable–Groundnut–T. Aman	2660	0.031	4	5
21	Onion–Sesame+B. Aman	2100	0.025	2	3
22	Sunflower–Fallow–T. Aman	2100	0.025	7	23
23	Potato–Sesame–T. Aman	2060	0.024	15	23
24	Potato–Sesame–Fallow	1930	0.023	6	10
25	Maize–Sesame–T. Aman	1835	0.021	6	9
26	Millet(Kaon)+Sesame–Fallow	1810	0.021	5	7
27	Grasspea–Sesame+B. Aman	1800	0.021	2	2
28	Grasspea–Sesame–T. Aman	1790	0.021	5	6
29	Mustard–Sesame+B. Aman	1650	0.019	3	4
30	Maize–Sesame–Fallow	1580	0.018	6	8

Table 13. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
31	Wheat−Sesame−Fallow	1550	0.018	7	8
32	Groundnut− Aus−Fallow	1550	0.018	5	5
33	Groundnut−Jute−T.Aman	1530	0.018	7	13
34	Grasspea−Sesame−Fallow	1330	0.016	7	10
35	Groundnut−Fallow−Blackgram	1320	0.015	3	3
36	Onion−Sesame−Fallow	1270	0.015	8	9
37	Sesame−Aus−Fallow	1190	0.014	3	4
38	Sesame−Aus−T. Aman	1180	0.014	4	5
39	Potato−Groundnut	1110	0.013	5	8
40	Lentil−Sesame+B. Aman	980	0.011	1	1
41	Coriander−Sesame−T. Aman	845	0.010	5	5
42	Wheat−Sesame−Blackgram (Orchard)	760	0.009	3	3
43	Soybean−Aus−Fallow	700	0.008	1	1
44	Maize−Groundnut	620	0.007	1	1
45	Sesame+B.Aman−Blackgram	600	0.007	1	1
46	Groundnut−Sesame−Fallow	590	0.007	4	5
47	Groundnut−Millet (*kaon*)−Fallow	380	0.004	2	2
48	Potato−Sesame−Aus	360	0.004	4	4
49	Sesame−B. Aman	330	0.004	2	2
50	Sesame−Jute−T. Aman	290	0.003	2	2
51	Soybean−Jute−Fallow	140	0.002	2	2
52	Sunflower−Jute−Fallow	135	0.002	3	3
	Total for minor edible oil crops	240980	2.813	-	-

Table 14. List of cropping patterns with pulse crops and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
1	Grasspea−Fallow−T. Aman	108150	1.26	25	80
2	Mungbean−Fallow−T. Aman	89650	1.05	22	70
3	Grasspea−Aus−T. Aman	81610	0.95	19	61
4	Mungbean−Aus−T. Aman	53730	0.63	14	43
5	Lentil−Jute−T. Aman	51875	0.61	34	96
6	Felon−Fallow−T. Aman	37675	0.44	14	53
7	Lentil−Jute−Fallow	32360	0.38	27	67
8	Wheat−Mungbean−T. Aman	21760	0.25	20	50
9	Grasspea−B. Aman	21480	0.25	21	52
10	Grasspea−Jute−Fallow	21000	0.25	21	39
11	Boro−Fallow−Blackgram	13270	0.15	27	44
12	Wheat−Aus−Blackgram	13000	0.15	6	8
13	Lentil−Fallow−T. Aman	12680	0.15	29	68
14	Lentil−Sesame−T. Aman	12450	0.15	14	33
15	Lentil−Aus−T. Aman	11255	0.13	25	46
16	Grasspea−Jute−T. Aman	10300	0.12	25	43
17	Felon−Aus−T. Aman	9245	0.11	7	16
18	Fallow−Fallow−Blackgram	8695	0.10	34	59
19	Boro−Aus−Blackgram	8540	0.10	5	5
20	Blackgram−B. Aman	7625	0.09	11	24

Table 14. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
21	Lentil−Mungbean−T. Aman	6955	0.08	11	22
22	Lentil−B. Aman	6550	0.08	16	30
23	Lentil−Vegetable−Vegetable	6330	0.07	19	30
24	Maize−Mungbean−T. Aman	4900	0.06	1	3
25	Mustard−Mungbean−T. Aman	4710	0.05	12	18
26	Chickpea−Fallow−T. Aman	4700	0.05	12	32
27	Grasspea−Boro−Fallow	4690	0.05	8	12
28	Lentil−Aus−Fallow	4570	0.05	11	15
29	Wheat−Jute−Blackgram	3910	0.05	7	9
30	Lentil−Sesame−Fallow	3680	0.04	15	20
31	Maize−Fallow−Blackgram	3600	0.04	4	4
32	Vegetable−Fallow−Blackgram	3525	0.04	16	33
33	Sesame−Fallow−Blackgram	3060	0.04	6	10
34	Lentil−Maize−T. Aman	2920	0.03	4	8
35	Wheat−Mungbean−Fallow	2875	0.03	5	7
36	Lentil−Fallow−Fallow (Orchard)	2780	0.03	3	5
37	Grasspea−Boro−B. Aman	2700	0.03	3	3
38	Lentil−Vegetable−T. Aman	2660	0.03	11	11
39	Fieldpea−B. Aman	2620	0.03	11	16
40	Garlic−Mungbean−T. Aman	2500	0.03	1	2
41	Blackgram−Jute−Fallow	2295	0.03	12	16
42	Grasspea−Fallow−Fallow	2295	0.03	9	11
43	Wheat−Mung−Fallow (Orchard)	2150	0.03	2	3
44	Fieldpea−Jute−Fallow	2100	0.02	10	15
45	Blackgram(Fodder)−Boro−B. Aman	2000	0.02	1	1
46	Fieldpea−Fallow−T. Aman	1950	0.02	18	27
47	Blackgram−Jute−T. Aman	1900	0.02	11	14
48	Mustard−Aus−Blackgram	1900	0.02	2	2
49	Onion−Aus−Blackgram	1810	0.02	5	6
50	Grasspea−Boro−Aus	1800	0.02	1	1
51	Grasspea−Sesame+B. Aman	1800	0.02	2	2
52	Grasspea−Sesame−T. Aman	1790	0.02	5	6
53	Grasspea−Sesbania−Fallow	1780	0.02	4	4
54	Blackgram−Aus−T. Aman	1735	0.02	10	13
55	Vegetab−Aus−Blackgram	1610	0.02	4	4
56	Grasspea−B. Aus+B. Aman	1580	0.02	6	8
57	Maize−Aus−Blackgram	1370	0.02	3	3
58	Grasspea−Sesame−Fallow	1330	0.02	7	10
59	Groundnut−Fallow−Blackgram	1320	0.02	3	3
60	Fieldpea−Aus−Vegetable	1310	0.02	7	8
61	Fieldpea−Vegetable−Fallow	1160	0.01	4	5
62	Potato−Mungbean−T. Aman	1140	0.01	11	13
63	Lentil−Sesame+B. Aman	980	0.01	1	1
64	Maize−Mungbean−Vegetable	950	0.01	3	3
65	Wheat−Fallow−Blackgram	900	0.01	1	1
66	Wheat−Sesame−B.gram (Orchard)	760	0.01	3	3
67	Sesame+B. Aman−Blackgram	600	0.01	1	1

Table 14. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
68	Felon−Aus−Fallow	470	0.01	2	3
69	Grasspea−Mungbean−T. Aman	440	0.01	5	5
70	Felon−Fallow−Fallow	380	0.00	3	4
71	Chickpea−Aus−T. Aman	375	0.00	5	7
72	Boro−Maize−Blackgram	350	0.00	1	8
73	Mungbean−Jute−Fallow	300	0.00	6	8
74	Chickpea−Jute−T. Aman	270	0.00	7	11
75	Grasspea−Aus−Blackgram	250	0.00	1	1
76	Mungbean−Jute−T. Aman	180	0.00	9	11
77	Mungbean−B. Aus+B. Aman	130	0.00	4	4
78	Lentil−Mungbean−Jute−T. Aman	100	0.00	1	1
79	Mustard−Mung−Aus−T. Aman	100	0.00	1	1
80	Potato+S. gourd−Mung−T Aman	80	0.00	1	1
81	Tobacco−Mungbean−T. Aman	50	0.00	1	1
82	Tobacco−Mungbean−Vegetable	40	0.00	1	1
83	Mungbean−Aus−Fallow	20	0.00	1	1
	Total of pulses	752435	8.78	-	-

Table 15. List of jute-based cropping patterns and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Wheat−Jute−T. Aman	147210	1.72	43	216
02	Onion−Jute−T. Aman	54185	0.63	39	102
03	Lentil−Jute−T. Aman	51875	0.61	34	96
04	Wheat−Jute−Fallow	48700	0.57	32	82
05	Onion−Jute−Fallow	45200	0.53	29	67
06	Boro−Jute−T.Aman	40440	0.47	19	56
07	Mustard−Jute−T. Aman	32740	0.38	29	64
08	Lentil−Jute−Fallow	32360	0.38	27	67
09	Potato−Jute−T. Aman	28310	0.33	36	95
10	Maize−Jute−Fallow	21425	0.25	19	33
11	Maize−Jute−T. Aman	21325	0.25	18	38
12	Grasspea−Jute−Fallow	21000	0.25	21	39
13	Soybean−Jute−T. Aman	20000	0.23	4	6
14	Mustard−Jute−Fallow	17180	0.20	16	35
15	Boro−Jute−Fallow	16370	0.19	19	25
16	Tobacco−Jute−T. Aman	15200	0.18	9	19
17	Potato−Jute−Fallow	14515	0.17	25	53
18	Fallow−Jute−T. Aman	13620	0.16	18	32
19	Garlic−Jute−Fallow	13475	0.16	26	48
20	Chilli−Jute−Fallow	13260	0.15	22	54
21	Vegetable−Jute−Fallow	13185	0.15	26	47
22	Garlic−Jute−T. Aman	13090	0.15	38	78
23	Vegetable−Jute−T. Aman	11305	0.13	25	51
24	Grasspea−Jute−T. Aman	10300	0.12	25	43
25	Coriander−Jute−Fallow	7390	0.09	15	25
26	Chilli−Jute−T. Aman	7250	0.08	20	35
27	Coriander−Jute−T. Aman	4625	0.05	17	30

Table 15. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
28	Tobacco−Jute−Fallow	4050	0.05	4	8
29	Wheat−Jute−Blackgram	3910	0.05	7	9
30	Chilli−Boro−Jute	3600	0.04	2	3
31	Sweet Potato−Jute−Fallow	3380	0.04	13	21
32	Mustard−Boro−Jute	3000	0.04	5	7
33	Mustard−Boro−Jute−T. Aman	2980	0.03	7	13
34	Blackgram−Jute−Fallow	2295	0.03	12	16
35	Potato−Boro−Jute−T. Aman	2160	0.03	4	5
36	Fieldpea−Jute−Fallow	2100	0.02	10	15
37	Blackgram−Jute−T. Aman	1900	0.02	11	14
38	Mustard−Jute−Vegetable	1900	0.02	3	5
39	Blackcumin−Jute−Fallow	1840	0.02	6	12
40	Groundnut−Jute−T. Aman	1530	0.02	7	13
41	Vegetable−Jute−Vegetable	1450	0.02	5	5
42	Wheat−Jute−Vegetable	1320	0.02	6	6
43	Blackcumin−Jute−T. Aman	1260	0.01	6	11
44	Vegetable−Boro−Jute	800	0.01	2	3
45	Sweet Potato−Jute−T. Aman	675	0.01	10	13
46	Millet (Cheena)−Jute−Fallow	620	0.01	2	2
47	Potato−Boro−Jute	590	0.01	2	2
48	Mu ngbean−Jute−Fallow	300	0.00	6	8
49	Sesame−Jute−T. Aman	290	0.00	2	2
50	Chickpea−Jute−T. Aman	270	0.00	7	11
51	Mu stard−Maize−Jute	200	0.00	1	1
52	Veg.−Onion−Jute−T. Aman	200	0.00	1	1
53	Mungbean−Jute−T. Aman	180	0.00	9	11
54	Soybean−Jute−Fallow	140	0.00	2	2
55	Sunflower−Jute−Fallow	135	0.00	3	3
56	Lentil−Mungbean−Jute−T. Aman	100	0.00	1	1
57	Total jute	778710	9.09	-	-

Table 16. List of cropping patterns with tobacco and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Tobacco−Jute−T. Aman	15200	0.177	9	19
02	Tobacco−Maize−T. Aman	7470	0.087	5	12
03	Tobacco−Aus−T. Aman	6040	0.071	5	12
04	Tobacco−Fallow−T. Aman	5310	0.062	7	15
05	Tobacco−Jute−Fallow	4050	0.047	4	8
06	Tobacco−Aus−Fallow	3180	0.037	5	10
07	Tobacco−Boro−T. Aman	2300	0.027	3	4
08	Tobacco−Sesbania−T.Aman	1620	0.019	1	2
09	Tobacco−Vegetab−Vegetab	1500	0.018	1	1
10	Tobacco−Fallow−Fallow	1045	0.012	5	8
11	Tobacco−Maize−Vegetable	600	0.007	1	1
12	Tobacco−Sesbania	600	0.007	1	1
13	Tobacco−Mung−T. Aman	50	0.001	1	1
14	Tobacco−Mung−Vegetable	40	0.000	1	1
	Total tobacco	49005	0.572	-	-

Vegetable is cultivated in fertile and well-drained soil often near the cities and towns. It is grown round the year in three seasons or in two seasons or in one season in a piece of land (Table 17). The most dominant vegetable containing CP is Vegetable-Vegetable-Vegetable which covered 143,270 hectares of land and 1.67% of NCA and was found to cultivate in 283 upazilas. The next CP was Vegetable-Fallow-T. Aman which covered about half of the land area of the first one and was found to cultivate in 172 upazilas. In low lying areas vegetables are usually not suitable. However, in some low lying areas vegetables are successfully cultivated in *dhap* or in sorjan system or in the bank of the *gher*. Potato, sweet potato and sweet gourd were considered separately and were not included in the vegetable containing CP's table.

Table 17. List of cropping patterns with vegetables and area coverage, 2014-15.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
01	Vegetable−Vegetable−Vegetable	143270	1.672	61	283
02	Vegetable−Fallow−T. Aman	74710	0.872	45	170
03	Vegetable−Vegetable−Fallow	63935	0.746	59	168
04	Vegetab−Vegetable−T. Aman	51745	0.604	49	127
05	Vegetable−Fallow−Fallow	31115	0.363	35	84
06	Vegetable−Aus−T. Aman	28700	0.335	42	87
07	Vegetable−Boro−T. Aman	21220	0.248	22	42
08	Vegetable−Aus−Fallow	15940	0.186	23	41
09	Boro−Vegetable	13335	0.156	27	36
10	Vegetable−Jute−Fallow	13185	0.154	26	47
11	Potato−Vegetable−T. Aman	12620	0.147	30	59
12	Onion−Vegtable−Vegetable	11735	0.137	39	87
13	Vegetable−Jute−T. Aman	11305	0.132	25	51
14	Chilli−Vegetable−Fallow	8810	0.103	44	104
15	Boro−Vegetable−T. Aman	8660	0.101	9	16
16	Fallow−Vegetable−T. Aman	7130	0.083	16	29
17	Maize−Vegetable−Fallow	7120	0.083	14	19
18	Vegetable−Boro−Fallow	7100	0.083	9	10
19	Lentil−Vegetable−Vegetable	6330	0.074	19	30
20	Wheat−Vegetable−Vegetable	6100	0.071	16	21
21	Wheat−Vegetable−T. Aman	5205	0.061	15	25
22	Vegetable−B. Aman	5200	0.061	9	17
23	Vegetable−Maize−T. Aman	4500	0.053	9	15
24	Garlic−Vegetable−Vegetable	4385	0.051	27	68
25	Vegetable−Fallow−Blackgram	3525	0.041	16	33
26	Vegetable−Onion−Aus	3200	0.037	3	3
27	Maize−Aus−Vegetable	3000	0.035	3	4
28	Lentil−Vegetable−T. Aman	2660	0.031	11	11
29	Vegetable−Groundnut−T. Aman	2660	0.031	4	5
30	Potato−Maize−Vegetable	2190	0.026	4	4
31	Vegetable−Maize−Fallow	2180	0.025	6	7
32	Coriander−Vegetable−Fallow	2090	0.024	20	29
33	Wheat−Maize−Vegetable	2000	0.023	2	2
34	Mustard−Jute−Vegetable	1900	0.022	3	5
35	Maize−Vegetable−T. Aman	1810	0.021	11	12

Table 17. Continued.

	Cropping pattern	Area (ha)	% of NCA	No. of district	No. of upazila
36	Vegetable−Aus−Blackgram	1610	0.019	4	4
37	Tobacco−Vegetable−Vegetable	1500	0.018	1	1
38	Vegetable−Jute−Vegetable	1450	0.017	5	5
39	Chilli−Vegetable−T. Aman	1405	0.016	15	19
40	Wheat−Jute−Vegetable	1320	0.015	6	6
41	Pea−Aus−Vegetable	1310	0.015	7	8
42	Fieldpea−Vegetable−Fallow	1160	0.014	4	5
43	Potato−Maize−Aus−Vegetable	1030	0.012	3	3
44	Maize−Mungbean−Vegetable	950	0.011	3	3
45	Vegetable−Boro−Aus−T. Aman	820	0.010	4	5
46	Vegetable−Boro−Jute	800	0.009	2	3
47	Potato−Boro−Vegetable	700	0.008	4	4
48	Tobacco−Maize−Vegetable	600	0.007	1	1
49	Sweet Potato−Vegetable−Fallow	540	0.006	5	9
50	Potato+Maize−Vegetable−T. Aman	210	0.002	2	2
51	Vegetable−Onion−Jute−T. Aman	200	0.002	1	1
52	Tobacco−Mungbean−Vegetable	40	0.000	1	1
	Total of CP with vegetable	606215	7.077	-	-

If a single one CP is considered, its geographical distribution also produce valuable information. Table 18 presents district-wise distribution of the most dominant CP, Boro-Fallow-T. Aman. This CP generally occupies medium high land area. Maximum area under this CP was in Mymensingh district with 188,650 hectares of land followed by Dinajpur district with 138,400 hectares of land. This CP was practiced in 63 districts. However, in Munshiganj, there was no Boro-Fallow-T. Aman CP. Because here, T. Aman is extremely rare. The lowest area under this CP was in Borguna. In Mymensingh, this CP occupied about 65.13% of its NCA as indicated by '% of district NCA'. In Mymensingh, the area under this CP was 8.18% of its total area of the country.

Table 18. Distribution of the most dominant Boro-Fallow- T. Aman cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in BD
01	Mymensingh	188650	65.13	8.18
02	Dinajpur	138400	49.99	6.00
03	Netrokona	98300	49.22	4.26
04	Gaibandha	96670	63.87	4.19
05	Naogaon	96400	35.59	4.18
06	Tangail	84000	36.04	3.64
07	Kurigram	83500	55.91	3.62
08	Rangpur	81300	46.39	3.53
09	Jessore	80700	42.48	3.50
10	Bogra	80200	36.10	3.48
11	Jamalpur	75300	46.83	3.27
12	Sherpur	69000	68.62	2.99
13	Nilphamari	65300	53.70	2.83
14	Jhenaidaha	54900	39.26	2.38
15	Chittagong	46420	23.19	2.01
16	Thakurgaon	45050	30.36	1.95
17	Lalmonirhat	44600	45.12	1.93

Table 18. Continued.

	District	Area (ha)	% of district NCA	% coverage of the pattern in BD
18	Sunamganj	43100	16.12	1.87
19	CoxBazar	42400	49.66	1.84
20	Satkhira	40950	33.72	1.78
21	Kishoreganj	40300	20.17	1.75
22	Comilla	38710	18.71	1.68
23	Sirajganj	38200	20.82	1.66
24	Bhola	35650	19.13	1.55
25	Sylhet	34200	16.27	1.48
26	B.Baria	34010	24.39	1.47
27	Panchagarh	32400	31.70	1.41
28	Narsingdi	31500	43.60	1.37
29	Barisal	31050	19.59	1.35
30	Chuadanga	28800	32.56	1.25
31	Feni	28800	40.04	1.25
32	Gazipur	27100	31.74	1.18
33	Natore	25490	18.85	1.11
34	Narail	24950	33.73	1.08
35	Maulvibazar	24650	19.34	1.07
36	Rajshahi	22400	13.40	0.97
37	Magura	20800	27.44	0.90
38	Lakshmipur	20200	20.22	0.88
39	Khulna	19870	15.64	0.86
40	Bagerhat	19600	17.26	0.85
41	Joypurhat	19200	24.46	0.83
42	Habiganj	19070	11.32	0.83
43	Kushtia	17900	15.60	0.78
44	Chandpur	14690	15.97	0.64
45	Chapainawabganj	14100	11.71	0.61
46	Noakhali	12460	6.28	0.54
47	Meherpur	9800	18.12	0.42
48	Khagrachhari	9570	21.59	0.42
49	Pabna	8650	4.69	0.38
50	Pirojpur	6540	7.95	0.28
51	Faridpur	6080	4.34	0.26
52	Jhalakati	5450	10.50	0.24
53	Rajbari	5450	7.17	0.24
54	Bandarban	5170	12.69	0.22
55	Rangamati	4660	10.67	0.20
56	Gopalganj	2900	2.56	0.13
57	Narayanganj	2200	5.54	0.10
58	Dhaka	2040	2.99	0.09
59	Madaripur	1800	2.16	0.08
60	Patuakhali	1670	0.79	0.07
61	Shariatpur	1455	1.87	0.06
62	Manikganj	980	1.05	0.04
63	Barguna	350	0.35	0.02
	Bangladesh	2306005	26.92	100.00

Table 19 presents district-wise distribution of the second most dominant CP, Boro-Fallow-Fallow. This CP is usually distributed in low lying areas like flood-prone areas, *haor, bil, charland* and riverbank areas. This CP was dominantly present in Sunamganj, Kishoreganj, Netrokona and Gopalganj districts. In Sunamganj, about 68% of its NCA was under this CP. Therefore, rest of about 32% of land remained for other CPs in the district. It indicated the suitability of Boro-Fallow-Fallow CP in Sunamganj as it is mainly consisted of low lying areas. This CP in Sunamganj occupied about 16% of the total of this CP in Bangladesh.

In Bangladesh, in some areas, there are some special conditions because of which crop cultivation is difficult in different seasons, e.g., in saline-prone areas or in tidal nonsaline areas or in extreme drought-prone areas with no irrigation facility. In these areas only T. Aman crop is cultivated in Kharif-II season which gives rise to Fallow-Fallow-T. Aman CP. Table 20 presents district-wise distribution of this CP. The highest coverage of this CP was found in Chittagong district which covered 33% of the area of this district. This CP in Chittagong district contributed 13% of this CP's total coverage of the country. In 36 districts this CP was noticed.

Similarly district-wise distribution of 4th, 5th and 6th dominant CPs viz, Boro-Aus- T. Aman, Fallow-Aus-T. Aman and Mustard-Boro-T. Aman are presented (Tables 21, 22 and 23).

Districtwise distribution of AC is presented in Table 24.The major ACs viz, banana, betel leaf, ginger, papaya, pineapple, sugarcane and turmeric were included in it. Individual AC and total AC area are mentioned in this table. AC production was the highest in Tangail which was followed by Natore and then Rangamati.

Districtwise total number of CPs, total number of crops, diversity index of CPs and crops are presented in Table 25. Comilla had the highest number of different CPs of 117 which was followed by Kushtia of 116 and then Jessore 101. The maximum number of 30 crops were cultivated in Munshiganj

which was followed by the four districts viz, Comilla, Faridpur, Manikganj and Noakhali each of which cultivated 28 crops. Pabna had the highest CP diversity which was followed by Rajshahi and then Kushtia. Pabna had the highest crop diversity which was followed by Rajshahi and then Kushtia as well.

CONCLUSION

A better understanding of the crop growing systems is essential to formulate ecologically and socioeconomically sustainable crop production programme. Therefore, quantitative measurement of crop distribution in an area is very important. To explore the potential of CPs it is necessary to integrate the available technologies to increase the total yield. Extension of agricultural land is not possible in Bangladesh. Moreover, NCA is decreasing at an alarming rate because of high population pressure. Identification of major CPs and exploring their potential is important. Increase production through utilizing fallow period in CP can create scope for sustainable improvement of agricultural production system.

This study had made this scope of improvement by creating relevant data base. This study identified all the CPs of Bangladesh. Ecologically well adjusted CPs dominated for their area coverage in appropriate environments. Regional distribution of CPs was also identified. These results will hopefully help further planning of potentials of CPs for production.

ACKNOWLEDGEMENT

Table 19. Distribution of the 2nd dominant Boro-Fallow-Fallow cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in BD
01	Sunamganj	181600	67.91	15.94
02	Kishoreganj	102000	51.04	8.95
03	Netrokona	78200	39.16	6.86
04	Gopalganj	66300	58.60	5.82
05	B.Baria	58050	41.63	5.09
06	Habiganj	55900	33.18	4.91
07	Sylhet	44450	21.15	3.90
08	Noakhali	43000	21.66	3.77
09	Comilla	34630	16.74	3.04
10	Mymensing	30320	10.47	2.66
11	Gazipur	25150	29.46	2.21
12	Naogaon	24100	8.90	2.11
13	Moulvibazar	22850	17.93	2.01
14	Chandpur	22100	24.03	1.94
15	Sirajganj	21700	11.82	1.90
16	Sariatpur	21500	27.56	1.89
17	Barisal	21450	13.54	1.88
18	Jessore	19030	10.02	1.67
19	Madaripur	18700	22.42	1.64
20	Dhaka	17750	26.05	1.56
21	Munsiganj	16400	26.54	1.44
22	Narayanganj	16400	41.33	1.44
23	Narsingdi	16100	22.29	1.41
24	Bagerhat	13700	12.07	1.20
25	Natore	12830	9.49	1.13
26	Tangail	12550	5.39	1.10
27	Pirojpur	11100	13.49	0.97
28	Kurigram	10600	7.10	0.93
29	Pabna	9600	5.21	0.84
30	Rajshahi	9150	5.48	0.80
31	Rangpur	7470	4.26	0.66
32	Khulna	7150	5.63	0.63
33	Satkhira	7000	5.76	0.61
34	Faridpur	6700	4.79	0.59
35	Gaibandha	6700	4.43	0.59
36	Jhenaidah	6560	4.69	0.58
37	Rajbari	6550	8.62	0.57
38	Narail	6200	8.38	0.54
39	Bogra	6000	2.70	0.53
40	Jamalpur	5180	3.22	0.45
41	Manikganj	5180	5.55	0.45
42	Rangamati	4250	9.73	0.37
43	Laxmipur	4200	4.20	0.37
44	Chapainawabganj	4050	3.36	0.36
45	Sherpur	2950	2.93	0.26
46	Kushtia	2450	2.13	0.22

Table 19. Continued.

	District	Area (ha)	% of district NCA	% coverage of the pattern in BD
47	Chuadanga	2200	2.49	0.19
48	Jhalkathi	2200	4.24	0.19
49	Lalmonirhat	2100	2.12	0.18
50	Magura	1970	2.60	0.17
51	Nilphamari	1450	1.19	0.13
52	Coxsbazar	860	1.01	0.08
53	Bandarban	700	1.72	0.06
54	Meherpur	600	1.11	0.05
55	Thakurgaon	500	0.34	0.04
56	Chittagong	400	0.20	0.04
57	Patuakhali	350	0.17	0.03
58	Feni	250	0.35	0.02
59	Dinajpur	150	0.05	0.01
	Total	1139530	13.30	100.00

Table 20. Distribution of the 3rd dominant Fallow-Fallow-T. Aman cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
01	Chittagong	66500	33.23	13.05
02	Sylhet	58250	27.72	11.43
03	Khulna	42000	33.05	8.24
04	Patuakhali	35600	16.81	6.99
05	Bagerhat	33700	29.68	6.61
06	Noakhali	32900	16.57	6.46
07	Moulvibazar	25070	19.67	4.92
08	Pirojpur	24620	29.92	4.83
09	Sunamganj	21900	8.19	4.30
10	Satkhira	21200	17.46	4.16
11	Borguna	19200	19.26	3.77
12	Feni	15600	21.69	3.06
13	Habiganj	12340	7.33	2.42
14	Chapainawab	11800	9.80	2.32
15	Barisal	11130	7.02	2.18
16	Coxsbazar	10400	12.18	2.04
17	Khagrachhari	9050	20.42	1.78
18	Jhalkathi	8200	15.80	1.61
19	Gazipur	7850	9.20	1.54
20	Naogaon	7300	2.69	1.43
21	Bhola	7200	3.86	1.41
22	Bandarban	5030	12.35	0.99
23	Netrokona	5000	2.50	0.98
24	Rangamati	3530	8.08	0.69
25	Comilla	3430	1.66	0.67
26	Mymensing	2600	0.90	0.51
27	Kishoreganj	2260	1.13	0.44
28	Tangail	1700	0.73	0.33
29	Bogra	1550	0.70	0.30
30	Sherpur	1320	1.31	0.26
31	Rangpur	350	0.20	0.07

Table 20. Continued.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
32	Jessore	300	0.16	0.06
33	Dinajpur	200	0.07	0.04
34	Laxmipur	200	0.20	0.04
35	Narsingdi	100	0.14	0.02
36	Panchgarh	100	0.10	0.02
	Total	509480	5.95	100.00

Table 21. Distribution of the 4th dominant Boro-Aus-T. Aman cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
01	Comilla	50680	24.49	24.25
02	Bogra	14290	6.43	6.84
03	Habiganj	14200	8.43	6.79
04	Naogaon	13600	5.02	6.51
05	Kishoreganj	12350	6.18	5.91
06	Jessore	11500	6.05	5.50
07	Bhola	10000	5.37	4.78
08	Chandpur	9280	10.09	4.44
09	Chittagong	9250	4.62	4.43
10	Mymensing	8000	2.76	3.83
11	Kushtia	6650	5.79	3.18
12	Chapainawabganj	6640	5.52	3.18
13	Brahmanbaria	4870	3.49	2.33
14	Rangpur	4570	2.61	2.19
15	Coxsbazar	3500	4.10	1.67
16	Natore	3400	2.51	1.63
17	Moulvibazar	3040	2.38	1.45
18	Pabna	2950	1.60	1.41
19	Satkhira	2780	2.29	1.33
20	Sirajganj	2450	1.34	1.17
21	Laxmipur	2200	2.20	1.05
22	Jhenaidah	1700	1.22	0.81
23	Rajshahi	1650	0.99	0.79
24	Dinajpur	1575	0.57	0.75
25	Sherpur	1350	1.34	0.65
26	Gazipur	1120	1.31	0.54
27	Noakhali	1070	0.54	0.51
28	Bagerhat	950	0.84	0.45
29	Kurigram	880	0.59	0.42
30	Sylhet	600	0.29	0.29
31	Magura	500	0.66	0.24
32	Khagrachhari	200	0.45	0.10
33	Rangamati	200	0.46	0.10
34	Gaibandha	170	0.11	0.08
35	Khulna	165	0.13	0.08
36	Jhalkathi	100	0.19	0.05
37	Pirojpur	100	0.12	0.05

Table 21. Continued.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
38	Sariatpur	100	0.13	0.05
39	Narsingdi	90	0.12	0.04
40	Bandarban	80	0.20	0.04
41	Feni	50	0.07	0.02
42	Jamalpur	50	0.03	0.02
43	Rajbari	50	0.07	0.02
44	Patuakhali	30	0.01	0.01
45	Nilphamari	20	0.02	0.01
46	Joypurhat	10	0.01	0.00
47	Tangail	5	0.00	0.00
	Total	209015	2.44	100.00

Table 22. Distribution of the 5th dominant Fallow-Aus-T. Aman cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
01	Sylhet	35600	16.94	18.42
02	Moulvibazar	33900	26.59	17.54
03	Habiganj	23825	14.14	12.33
04	Jhalkathi	12300	23.70	6.36
05	Noakhali	12200	6.15	6.31
06	Chittagong	9290	4.64	4.81
07	Pirojpur	8800	10.70	4.55
08	Borguna	8540	8.57	4.42
09	Barisal	8400	5.30	4.35
10	Mymensing	8400	2.90	4.35
11	Rajshahi	4500	2.69	2.33
12	Feni	4200	5.84	2.17
13	Sunamganj	3730	1.39	1.93
14	Comilla	3350	1.62	1.73
15	Bhola	2900	1.56	1.50
16	Kishoreganj	2200	1.10	1.14
17	Patuakhali	2060	0.97	1.07
18	Bagerhat	1740	1.53	0.90
19	Naogaon	1620	0.60	0.84
20	Laxmipur	1200	1.20	0.62
21	Khagrachhari	1110	2.50	0.57
22	Sherpur	1100	1.09	0.57
23	Brahmanbaria	810	0.58	0.42
24	Netrokona	410	0.21	0.21
25	Satkhira	380	0.31	0.20
26	Coxsbazar	250	0.29	0.13
27	Rangamati	210	0.48	0.11
28	Khulna	100	0.08	0.05
29	Tangail	100	0.04	0.05
30	Gazipur	50	0.06	0.03
	Total	193275	2.26	100.00

Table 23. Distribution of the 6th dominant Mustard-Boro-T. Aman cropping pattern and area coverage in Bangladesh, 2014-15.

	District	Area (ha)	% of district NCA	% coverage of the pattern in country
01	Naogaon	22600	8.34	12.24
02	Bogra	19800	8.91	10.72
03	Tangail	14150	6.07	7.66
04	Jamalpur	11500	7.15	6.23
05	Dinajpur	10250	3.70	5.55
06	Joypurhat	9900	12.61	5.36
07	Sirajganj	9810	5.35	5.31
08	Kurigram	8000	5.36	4.33
09	Thakurgaon	7650	5.16	4.14
10	Jhenaidaha	7050	5.04	3.82
11	Gaibandha	6650	4.39	3.60
12	Jessore	6000	3.16	3.25
13	Sherpur	5450	5.42	2.95
14	Magura	5100	6.73	2.76
15	Manikganj	4720	5.05	2.56
16	Rangpur	3950	2.25	2.14
17	Mymensing	2930	1.01	1.59
18	Nilphamari	2850	2.34	1.54
19	Bhola	2570	1.38	1.39
20	Meherpur	2400	4.44	1.30
21	Satkhira	2390	1.97	1.29
22	Dhaka	1710	2.51	0.93
23	Narsingdi	1610	2.23	0.87
24	Madaripur	1510	1.81	0.82
25	Kishoreganj	1450	0.73	0.79
26	Lalmonirhat	1390	1.41	0.75
27	Chapainawabganj	1300	1.08	0.70
28	Rajshahi	1250	0.75	0.68
29	Chandpur	1000	1.09	0.54
30	Narail	950	1.28	0.51
31	Netrokona	940	0.47	0.51
32	B.Baria	900	0.65	0.49
33	Panchagarh	820	0.80	0.44
34	Kushtia	700	0.61	0.38
35	Pabna	600	0.33	0.32
36	Natore	500	0.37	0.27
37	Sunamganj	500	0.19	0.27
38	Coxsbazar	420	0.49	0.23
39	Chuadanga	400	0.45	0.22
40	Chittagong	210	0.10	0.11
41	Comilla	200	0.10	0.11
42	Gazipur	110	0.13	0.06
43	Narayanganj	100	0.25	0.05
44	Khulna	80	0.06	0.04
45	Barisal	70	0.04	0.04
46	Habiganj	50	0.03	0.03
47	Rajbari	50	0.07	0.03
48	Faridpur	30	0.02	0.02
49	Lakshmipur	30	0.03	0.02
50	Khagrachhari	10	0.02	0.01
51	Maulvibazar	10	0.01	0.01
	Total	184620	2.16	100.00

Table 24. Distribution of annual crops in different districts of Bangladesh, 2014-15.

	District	Banana	Betel leaf	Ginger	Papaya	Pineapple	Sugarcane	Turmeric	Total
01	Brahmanbaria	17	0	75	34	0	80	84	290
02	Bagerhat	1290	1080	0	110	0	920	30	3430
03	Bandarban	7120	0	1410	840	2835	215	1260	13680
04	Barguna	150	355	0	65	3	57	0	630
05	Barisal	1235	2678	6	465	0	600	111	5095
06	Bhola	2735	510	60	490	15	1060	335	5205
07	Bogra	973	0	128	165	0	84	170	1520
08	Chandpur	195	200	63	15	0	410	62	945
09	Chapainawabganj	590	0	100	220	0	10150	100	11160
10	Chittagong	2320	420	710	842	162	381	345	5180
11	Chuadanga	480	2000	10	10	0	645	255	3400
12	Comilla	286	130	37	71	30	360	66	980
13	Coxsbazar	464	2705	80	136	25	350	70	3830
14	Dhaka	310	0	30	270	0	60	70	740
15	Dinajpur	1095	40	280	55	0	2050	625	4145
16	Faridpur	1315	20	0	480	0	3525	250	5590
17	Feni	95	0	0	35	0	150	0	280
18	Gaibandha	998	130	190	47	0	2415	330	4110
19	Gazipur	3575	0	305	2205	120	775	540	7520
20	Gopalganj	515	5	0	240	0	1020	10	1790
21	Habiganj	157	120	132	98	200	310	183	1200
22	Jamalpur	550	40	70	0	120	1935	95	2810
23	Jessore	1050	1130	50	135	0	475	1180	4020
24	Jhalakati	1515	580	3	420	0	190	122	2830
25	Jhenaidaha	4335	2335	5	495	0	1880	1100	10150
26	Joypurhat	562	0	59	31	0	520	328	1500
27	Khagrachhari	1800	0	3020	160	415	345	4480	10220
28	Khulna	190	570	10	45	0	80	185	1080
29	Kishoreganj	747	0	77	232	0	267	167	1490
30	Kurigram	713	5	350	72	0	270	350	1760
31	Kushtia	2380	2120	25	80	0	1925	750	7280
32	Laksmipur	160	20	0	40	0	140	40	400
33	Lalmonirhat	160	0	330	10	0	110	680	1290
34	Madaripur	210	192	0	140	0	493	5	1040
35	Magura	455	154	0	71	0	200	780	1660
36	Manikganj	110	0	40	50	0	2100	50	2350
37	Maulvibazar	480	25	255	20	750	20	270	1820
38	Meherpur	1460	0	0	0	0	170	710	2340
39	Munsiganj	55	0	15	10	0	85	25	190
40	Mymensingh	435	267	450	136	228	2669	1875	6060
41	Naogaon	730	0	125	150	0	1225	270	2500
42	Narail	255	235	5	35	0	825	315	1670
43	Narayanganj	40	0	0	30	0	110	0	180
44	Narsingdi	2140	300	0	160	190	60	0	2850
45	Natore	1110	10	50	110	0	15040	920	17240
46	Netrokona	27	0	82	32	0	27	142	310
47	Nilphamari	210	0	870	45	0	175	1010	2310

Table 24. Continued.

	District	Banana	Betel leaf	Ginger	Papaya	Pineapple	Sugarcane	Turmeric	Total
48	Noakhali	1350	10	0	68	0	112	0	1540
49	Pabna	305	10	0	90	0	4605	910	5920
50	Panchagarh	175	20	260	5	0	1150	700	2310
51	Patuakhali	353	634	0	90	0	157	111	1345
52	Pirojpur	880	478	8	105	5	373	281	2130
53	Rajbari	600	0	0	25	0	1245	490	2360
54	Rajshahi	1080	295	0	590	0	8045	410	10420
55	Rangamati	7666	0	2420	305	1245	199	2545	14380
56	Rangpur	1285	50	865	50	0	1200	900	4350
57	Satkhira	460	445	10	59	21	132	703	1830
58	Shariatpur	365	80	0	120	0	635	60	1260
59	Sherpur	40	5	270	0	0	25	420	760
60	Sirajganj	280	0	200	120	0	1670	170	2440
61	Sunamganj	145	0	28	100	10	195	32	510
62	Sylhet	68	0	5	759	203	50	15	1100
63	Tangail	6085	30	1685	275	7530	955	3690	20250
64	Thakurgaon	290	0	100	50	0	1950	400	2790
	Bangladesh	69221	20433	15358	12413	14107	79651	32582	243765

Table 25. Crop diversity and cropping intensity of different districts in Bangladesh, 2014-15.

	District	No. of identified pattern	No. of crop	Diversity index for cropping pattern	Crop diversity index (CDI)	C.I. (%)
01	B.Baria	62	18	0.757	0.883	165
02	Bagerhat	53	20	0.848	0.921	161
03	Bandarban	49	24	0.953	0.963	138
04	Barguna	29	17	0.868	0.939	218
05	Barisal	74	20	0.911	0.955	192
06	Bhola	61	25	0.933	0.972	228
07	Bogra	96	27	0.803	0.925	248
08	Chandpur	74	22	0.880	0.945	190
09	ChapaiN.ganj	62	18	0.944	0.975	217
10	Chittagong	63	25	0.826	0.924	180
11	Chuadanga	48	23	0.867	0.945	224
12	Comilla	117	28	0.868	0.932	210
13	CoxBazar	44	22	0.725	0.856	197
14	Dhaka	67	25	0.889	0.937	196
15	Dinajpur	75	22	0.723	0.889	228
16	Faridpur	96	28	0.942	0.972	225
17	Feni	34	22	0.777	0.879	183
18	Gaibandha	52	23	0.583	0.807	210
19	Gazipur	47	26	0.801	0.880	161
20	Gopalganj	57	25	0.643	0.824	146

Table 25. Continued.

	District	No. of identified pattern	No. of crop	Diversity index for cropping pattern	Crop diversity index (CDI)	C.I. (%)
21	Habiganj	46	21	0.827	0.916	170
22	Jamalpur	77	22	0.762	0.898	220
23	Jessore	101	25	0.799	0.920	225
24	Jhalakati	40	21	0.891	0.944	189
25	Jhenaidaha	76	26	0.833	0.931	223
26	Joypurhat	45	19	0.697	0.879	267
27	Khagrachhari	47	23	0.900	0.929	151
28	Khulna	52	21	0.839	0.922	159
29	Kishoreganj	91	21	0.694	0.852	156
30	Kurigram	78	25	0.673	0.854	214
31	Kushtia	116	26	0.955	0.982	240
32	Lakshmipur	44	21	0.878	0.945	240
33	Lalmonirhat	44	22	0.750	0.897	223
34	Madaripur	57	24	0.910	0.967	204
35	Magura	55	26	0.878	0.980	251
36	Manikganj	75	28	0.917	0.958	212
37	Maulvibazar	47	20	0.819	0.894	168
38	Meherpur	40	21	0.932	0.973	239
39	Munsiganj	38	30	0.835	0.915	177
40	Mymensingh	71	24	0.562	0.779	199
41	Naogaon	90	23	0.848	0.936	221
42	Narail	37	21	0.850	0.932	210
43	Narayanganj	45	27	0.800	0.906	158
44	Narsingdi	54	23	0.753	0.861	181
45	Natore	68	22	0.939	0.972	210
46	Netrokona	54	20	0.603	0.746	160
47	Nilphamari	59	21	0.695	0.875	224
48	Noakhali	49	28	0.892	0.953	178
49	Pabna	90	29	0.970	0.987	230
50	Panchagarh	65	24	0.862	0.938	216
51	Patuakhali	51	22	0.893	0.951	203
52	Pirojpur	50	24	0.858	0.930	162
53	Rajbari	50	26	0.937	0.971	234
54	Rajshahi	99	27	0.964	0.984	221
55	Rangamati	41	25	0.944	0.954	128
56	Rangpur	70	22	0.768	0.907	227
57	Satkhira	62	22	0.840	0.923	193
58	Shariatpur	72	25	0.905	0.963	178
59	Sherpur	44	20	0.522	0.785	213
60	Sirajganj	100	30	0.891	0.950	206
61	Sunamganj	52	24	0.506	0.656	123
62	Sylhet	38	21	0.820	0.894	151
63	Tangail	89	29	0.842	0.922	204
64	Thakurgaon	50	23	0.887	0.955	240
	Bangladesh	316	48	0.896	0.952	200

team and sincerely participated in every stage of the study especially in all the workshops conducted separately in 64 districts during the study. They provided us with the information based on which the study was conducted. The research team is very thankful to the former DG of BRRI, Dr Jiban Krishna Biswas and also the former DG of DAE, Mr Mamtajul Karim for their advice and support to the team.

REFERENCES

Ali, M Y. 2014. Farming Systems of Bangladesh: Poverty Escape Pathways and Livelihood Improvement. Pub. by: Anjuman Ara, D-186/7, Nazrul Sarani, Middle Sayabithi, Joorpukur, Gazipur 1700, Bangladesh.

Anonymous. 2016a. Statistical Year Book of Bangladesh 2015. Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning.

Anonymous. 2016b. Year Book of Agricultural Statistics-2015. Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning.

Catling, H D, D W Puckridge and D H Lambers. 1988. The environment of Asian deepwater rice. In: Proceeding of the 1987 international deepwater rice workshop. International Rice Research Institute, P. O. Box 933, Manila, Philippines.

Chowdhury, M K A, M R I Mondal and M A Quayyum. 2008. Proceedings of the National Workshop on Research and Development of Multiple Cropping Systems in Bangladesh held at Bangladesh Agriculture Research Council, Farmgate, Dhaka-1215, Bangladesh, held on 23-24 April, 2008.

FAO, 1988. Land Resources Appraisal of Bangladesh for Agricultural Development- Report 2: Agroecological regions of Bangladesh. Food and Agriculture Organization of the United Nations, Rome, Italy, 570p

Hasan, M N, M S Hossain, M A Bari and M R Islam. 2013. Agricultural land availability in Bangladesh. SRDI, Dhaka, Bangladesh.

Hossain, M I, M Y Rahman and P Bala. 2016. Agricultural adaptations for climate change in Dacope upazila of Bangladesh. Bangladesh Res. Pub. J. 12 (1): 60-70.

Kabir, M S, M U Salam, A Chowdhury, N M F Rahman, K M Iftekharuddaula, M S Rahman, M H Rashid, S S Dipti, A Islam, M A Latif, A K M S Islam, M M Hossain, B Nessa, T H Ansari, M A Ali and J K Biswas. 2015. Rice vision for Bangladesh: 2050 and beyond. Bangladesh Rice J. 19(2): 1-18.

Kshirsagar, KG, S Pandey and MR Bellon. 1997. Farmers' perception, varietal characteristics and technology adoption: the case of rainfed village in eastern India. Discussion paper5/97. Social Sciences Division, IRRI, Philippines.

Khush G S. 1984. Terminology for rice growing environments. In: Terminology for rice growing environments. International Rice Research Institute, P. O. Box 933, Manila, Philippines.

Miah, N M, A U Ahmed and B A A Mustafi. 2004. Adopting modern rice technologies in flood-prone areas: status, constraints and opportunities. In: Rice research and development in the flood-prone ecosystem. Proceedings of the international workshop on flood-prone rice systems held in Gazipur, Bangladesh, 9-11 January 2001. International Rice Research Institute, P. O. Box 933, Manila, Philippines.

Nur-E-Elahi, A H Khan, M R Siddique, A Saha, M Nasim, M I U Mollah and S M Shahidullah. 2001. Existing Cropping Patterns of Bangladesh, Potential Technologies and Strategies for Improving Systems Productivity. In: Proceedings of the Workshop on Modern Rice Cultivation in Bangladesh, held on 14-16 February 1999 at Bangladesh Rice Research Institute, Gazipur. BRRI Publication No. 132.

Rahman, M M, M A Aziz, M A Musa and J Kumar. 1995. Prospects of pulse crops in the rice-based cropping system in Bangladesh. In: Fragile lives in fragile ecosystems. Proceedings of the international rice research conference, 13-17 February 1995. International Rice Research Institute, P.O. Box 933, Manila, Philippines.

Shahidullah, S M, M S A Talukder, M S Kabir, A H Khan and N E Elahi. 2006. Cropping patterns in the South East Coastal Region of Bangladesh. J. Agric. Rural Dev. 4(1&2): 53-60.

Sujatha, P J, S Punithavathi, Tamilenthi and R Baskaran. 2011. Land use pattern and cropping pattern of Orthanadu Block, Thanjavur district, Tamil Nadu using GIS. J. Experimental Sci. 2(5): 19-23.