

# National Agricultural Policy 2018

Ministry of Agriculture  
Government of the People's Republic of Bangladesh

Prime Minister  
Government of the People's Republic of Bangladesh  
1st August 2018

## Message

Agriculture is the main driving force of Bangladesh's economy. The role of the agricultural sector in the providing food and nutrition, supplying raw materials for industries and creating employment is infinite. The progress of agriculture-dependent Bangladesh largely depends on the success of the country's agrarian society. Under the leadership of the all-time greatest Bengali, the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman, the country's hardworking peasant population played a glorious role in the Bengali's Great Liberation War. After the Liberation, the father of the Nation adopted several developmental and welfare activities for agriculture and for the farmers.

Under the direct guidance of the Father of the Nation, nutrition and public health was marked as one of the main responsibilities in the Constitution of Bangladesh. In continuance with this, an initiative was taken to formulate a policy with the aim to achieve revolutionary change in the agricultural sector. But it is the nation's misfortune, that he could not finish this work. As a result of the absence of a policy, the continuous development of the agricultural sector was disrupted. It is necessary to have an appropriate agricultural policy ensuring the establishment of the farmer's rights and agricultural improvement.

The Bangladesh Awami League expressed its long-term commitment towards adopting well-planned developmental activities in agriculture, with highest priority given to this sector in its Election Manifesto, 1996 and began to implement agricultural developmental activities with increasing investment. The 'National Agricultural Policy 1999' was formulated as a long-term plan for overall welfare of the farmers and agriculture after the formation of the government. As a result, visible success was gained, and the country reached at the doorsteps of self-sufficiency in food.

Later following the goals and the development strategy of the government, the 'National Agricultural Policy 1999' was refined and an amended and 'National Agricultural Policy 2013'

was formulated and as a result of implementing the same, Bangladesh emerged as a self-sufficient country in food.

The principal objective of the agricultural policy is to meet the rising challenges in agriculture by innovation of high yield and shock-resistant crop variety and technology, thereby ensuring food and nutrition security and commercialization of agriculture. To achieve this goal, following the 7th Five Year Plan, Sustainable Development Goals, Rupakalpa 2041 and others, the goal and development strategy of the government and with the reviewing of 'National Agricultural Policy 2013', the 'National Agricultural Policy 2018' has been formulated.

Considering the challenges in present-day agriculture, possibilities and excellence of global agro-technology, emphasis have been given in this policy to the matter of enhancing institutional capability. Along with this, it will be possible to attain sustainable agricultural production with the use of advancing organic and nanotechnology and the successful use of 'Bangabandhu Satellite-1' in the sector of exchanging better information technology in agriculture.

I firmly believe that following the 'National Agricultural Policy 2018', planned development of the agricultural sector will be accelerated and this policy will also work as a strategy in the implementation of the Father of the Nation's dream of creating a hunger and poverty-free golden Bangladesh.

I expect the successful implementation of 'National Agricultural Policy, 2018'.

Hail Bengal, Hail Bangabandhu

Long live Bangladesh.

Sheik Hasina

### **Message**

Agriculture is one of the main driving forces of Bangladesh's economy and livelihoods. The agriculture-related social improvement of the rural communities and ensuring protection and food security through agricultural development is the priority. The government of Sheikh Hasina has adopted a well-thought plan to ensure primarily overall agricultural development consistent to climate change, globalisation, rise in population and the demand for diverse food items because of rise in national income and limited natural resources.

The father of the nation, Sheikh Mujibur Rahman marked the economic development of agriculture as the most preferred sector. Under the dynamic leadership and pragmatic guidance of Bangabandhu's ideal successor, the respected Prime Minister, the jewel of farmers, Sheikh Hasina, the Awami League Government formulated the 'National Agricultural Policy 1999' to make crop production profitable through well-thought, integrated and well-planned activities. Later, addressing the changing climate and other challenges in making agriculture sustainable and to ensure food and nutrition security, the 'National Agricultural Policy 2013' was formulated.

Agricultural sector plays an important role in the socio-economic development of a large number of people through increasing agricultural productivity, income generation and creation of employment. The 'National Agricultural Policy 2018' has been formulated with the implementation of the promise of creating a modern Bangladesh with moderate income and to meet all the arising challenges. Problems and possibilities in agriculture, transforming problems into possibilities, research and development, application of information technology and nanotechnology in agriculture, agricultural extension, agricultural cooperatives, agricultural marketing, specialized agriculture, roof-top agriculture, floating agriculture, location-specific agriculture, women and youth in agriculture, knowledge and skill development, agricultural mechanisation and use of solar energy in agriculture are some of the remarkable topics that have been included in the newly drafted policy. Alongside appropriate preservation of natural resources, the increase in crop productivity and

intensification of crops, the introduction of the productive and profitable agricultural system and mostly transformation from subsistence agriculture to commercial agriculture have been reflected in this policy. The main objective of 'Agricultural Policy 2018' is to make integrated agriculture services available at the doorsteps of the farmers with the use of modern scientific technology.

The opinions of the associated ministry, office, institutions, farmers of all levels, public, elected leaders, agricultural representative, agricultural scientists, extension staff, several professional organisations and representative of NGOs have been taken into consideration while drafting the 'National Agricultural Policy 2018'.

The Ministry of Agriculture is happy to formulate and present the 'National Agricultural Policy 2018' with the participation of all those who are associated with it. I believe further acceleration of agricultural development and making it more sustainable is possible through the successful implementation of the formulated agricultural policy.

Long Live Bengal, Hail Bangabandhu.

Long Live Bangladesh.

Motiya Choudhary MP

Senior Secretary  
Ministry of Agriculture  
Government of People's Republic of Bangladesh

### **Message**

The success of Bangladesh in agriculture is acknowledged and praised. Agrarian Bangladesh has crossed the boundaries of traditional agriculture and livelihood agriculture and is progressing towards commercial agriculture. In achieving agricultural success, there are several obstacles too. The role of modernization of the agricultural sector connected with the formulation and pursuance of a well-planned policy is undeniable in crossing the obstacles and improving the life quality of the people employed in the profession of agriculture.

The founder of Bangladesh, the father of the Nation, Bangabandhu Sheikh Mujibur Rahman understood the importance of agriculture and took revolutionary steps in agricultural development, the announcement of Green Revolution being one of them. The prudent decision of the father of the nation marked the beginning of the journey of sustainable agriculture with the introduction of scientific cultivation. Through the re-establishment of agricultural research institutions, there emerged a pattern of free-thinking in agricultural research. Besides, initiatives were taken to ensure easy access to agricultural inputs like seeds, fertilizers, irrigation etc. to help increase productivity. All this was the result of the father of the nation's dream agricultural policy.

Bangladesh is known as a deltaic plain endowed with alluvial land, plenty of water and crops, bountiful greenery. Increasing population and increasingly diminishing cultivable land, the constant strife between the two factors have faced agriculture with a challenge. To these have been added the several natural abnormalities caused by global warming. Tackling all these challenges, the food and nutrition security of the public depends on agriculture. Under the guidance of the respected Prime Minister and the leadership of respected Minister of Agriculture Motiya Choudhary, the first-ever 'National Agricultural Policy 1999' was formulated. Later in 2013, the policy was amended. The 'National Agricultural Policy 2018' was formulated in realistic terms to be able to address the present and future challenges. Problems and possibilities in the agricultural sector, research and development, agricultural extension, agricultural cooperatives, agricultural marketing, specialized agriculture, location-specific agriculture, use of information technology in agriculture, women and youth power in

agriculture, knowledge and skill development, agricultural mechanisation and above all new innovation and initiatives in agriculture are some of the aspects that have been included in this policy. Appropriate preservation of natural resources, the intensification of crops and the introduction of the productive sustainable agricultural system have been reflected in this agricultural policy.

The thoughtful opinion of people and farmers of all levels, agricultural scientists, extension staff, several professional organisations, representatives of NGOs and institutions aiding developmental activities have been used along with the opinion of associated ministry and organisations in the formulation of the policy.

The 'National Agricultural Policy 2018' will be helpful in the sustainable development of agriculture and implementation of the SDG related agricultural goals through the innovation of new breeds and technology and its expansion with the help of agricultural research.

Mohammad Moinuddin Abdullah

Senior Secretary

## Contents

1. <a href="#">Introduction</a>	13
2. <a href="#">Goals and Objectives of the National Agricultural Policy</a>	17
2.1 <a href="#">Principal goals</a>	
2.2 <a href="#">Main Objective</a>	
2.3 <a href="#">Specific Objectives</a>	
3. <a href="#">Research in Agricultural development</a>	18
3.1 <a href="#">Development in Agricultural Research Management</a>	18
3.2 <a href="#">Planning and Financing</a>	19
3.3 <a href="#">Research Area and Sectors</a>	19
3.3.1 <a href="#">Development of crop varieties</a>	
3.3.2 <a href="#">Bio-technology Research</a>	
3.3.3 <a href="#">Nanotechnology</a>	
3.3.4 <a href="#">Genetic Resources</a>	
3.3.5 <a href="#">Research on Microorganisms</a>	
3.3.6 <a href="#">Climate Change, shock-tolerant varieties and technology</a>	
3.3.7 <a href="#">Cash-crops, high value and horticultural crops and resultant nutrition</a>	
3.3.8 <a href="#">Natural Resources Management-related research</a>	
3.3.9 <a href="#">Unconventional and off-season crops</a>	
3.3.10 <a href="#">Developing efficiency of agricultural implements</a>	
3.3.11 <a href="#">Innovating technology in cultivation and caring</a>	
3.3.12 <a href="#">Crop zoning</a>	
3.3.13 <a href="#">Pest management</a>	
3.3.14 <a href="#">Research on Farming System</a>	
3.3.15 <a href="#">Post-harvest Technology</a>	
3.3.16 <a href="#">Diversification and intensification of crops and yield differentiation</a>	
3.3.17 <a href="#">Research on Agricultural Mechanisation</a>	
3.3.18 <a href="#">Socio-economic Research</a>	
3.3.19 <a href="#">Strategy of spreading technology</a>	
4. <a href="#">Transfer of Technology and Agricultural Extension</a>	27



4.1	<a href="#">Main objective of extension</a>	27
4.2	<a href="#">Method of Communication</a>	27
4.3	<a href="#">Area of Extension</a>	29
4.4	<a href="#">Inclusive Participation</a>	30
4.5	<a href="#">Disaster Management and crop security</a>	30
4.6	<a href="#">Local Knowledge/Technology and Experience</a>	30
4.7	<a href="#">Farmer's Group/ Club</a>	31
4.8	<a href="#">Crop technology</a>	31
4.9	<a href="#">Ensuring quality of seeds and crops</a>	31
5.	<a href="#">Agricultural Inputs</a>	32
5.1	<a href="#">Seeds, saplings and Grafting</a>	32
5.1.1	<a href="#">Development and monitoring of seed management</a>	
5.1.2	<a href="#">Seed multiplication/germination, distribution and seeds industries</a>	
5.2	<a href="#">Fertilizers (Chemical, Bio and Organic)</a>	33
5.2.1	<a href="#">Collection, distribution, quality control and observation</a>	
5.2.2	<a href="#">Organic, green and bacterial fertilizers</a>	
5.3	<a href="#">Pest eradication and pest control management</a>	34
5.4	<a href="#">Irrigation and water management</a>	35
5.4.1	<a href="#">Irrigation efficiency and water productivity</a>	
5.4.2	<a href="#">Planning and Monitoring</a>	
5.4.3	<a href="#">Preservation and Usage</a>	
5.5	<a href="#">Energy for irrigation</a>	37
5.6	<a href="#">Ownership of small-scale irrigation and farmer loans</a>	37
6.	<a href="#">Farm Mechanisation</a>	
7.	<a href="#">Knowledge and Capability Development</a>	38
7.1	<a href="#">Human Resource Development</a>	39
7.1.1	<a href="#">Training Partners</a>	
7.1.2	<a href="#">Sectors of training</a>	
7.2	<a href="#">Transfer of Technology</a>	39
7.3	<a href="#">Areas of Training</a>	40
7.3.1	<a href="#">Skill development</a>	

7.3.2	<a href="#">Employment generation</a>	
7.3.3	<a href="#">Stimulation and Incentives</a>	
7.3.4	<a href="#">Knowledge</a>	
7.3.5	<a href="#">Innovation</a>	
8.	<a href="#">Agricultural Environment and Natural Resource Management</a>	42
8.1	<a href="#">Agricultural Environment and Natural Resource Management</a>	42
8.2	<a href="#">Changing climate and agriculture</a>	43
8.2.1	<a href="#">Eco-friendly technology</a>	
8.2.2	<a href="#">Preservation of environmental and natural resources</a>	
8.3	<a href="#">Adverse Weather and Pest warning and preparation</a>	44
8.4	<a href="#">Agroforestry</a>	44
9.	<a href="#">Special Regional Agriculture</a>	45
9.1	<a href="#">Coastal agriculture</a>	45
9.2	<a href="#">Marshy and Water Land Agriculture</a>	46
9.3	<a href="#">Cultivation on hills</a>	47
9.4.	<a href="#">Barind agriculture</a>	48
9.5	<a href="#">Agriculture in char lands.</a>	49
9.6	<a href="#">Natural Disaster and agricultural rehabilitation</a>	49
9.6.1	<a href="#">Flood</a>	
9.6.2	<a href="#">Extreme temperature</a>	
9.7.	<a href="#">Cyclone and tides</a>	50
9.8	<a href="#">Drought</a>	50
9.9	<a href="#">Thunderstorm</a>	50
9.10	<a href="#">Submergence and salinization</a>	50
10.	<a href="#">Specialized agriculture</a>	51
10.1	<a href="#">Rooftop cultivation</a>	51
10.2	<a href="#">Hydroponic and aeroponics agriculture</a>	51
10.3	<a href="#">Mushroom and other high-value crop cultivation</a>	51
10.4	<a href="#">Protective Agriculture</a>	52
10.5	<a href="#">Conservation Cultivation</a>	52
10.6	<a href="#">Potential of marine areas</a>	52

10.7	<a href="#">Floating Agriculture</a>	53
10.8	<a href="#">Sojourn Agricultural Method</a>	53
10.9	<a href="#">Precision agriculture</a>	53
11.	<a href="#">Food security and production of agricultural goods</a>	54
11.1	<a href="#">Increasing capability</a>	54
11.2	<a href="#">Development, Awareness and training</a>	54
12.	<a href="#">Agricultural Marketing</a>	55
12.1	<a href="#">Agricultural Marketing infrastructure development</a>	55
12.1.1	<a href="#">Agricultural industries and imports</a>	
12.1.2	<a href="#">Market information collection and promotional services</a>	
12.2	<a href="#">Processing of Agricultural goods and expansion of industries</a>	56
12.3	<a href="#">Commercial agriculture</a>	56
12.4	<a href="#">Import-oriented goods production</a>	56
12.5	<a href="#">Market Development</a>	57
13.	<a href="#">Women empowerment</a>	57
14.	<a href="#">Youth power in Agriculture</a>	58
15.	<a href="#">Investment in Agriculture</a>	59
15.1	<a href="#">Research, Infrastructure and Human Resource Development</a>	59
15.2	<a href="#">Agricultural industries and employment</a>	60
15.3	<a href="#">Incentive, agricultural rehabilitation and market development</a>	60
16.	<a href="#">Agricultural cooperatives</a>	61
17.	<a href="#">Information and Communication Technology</a>	62
18.	<a href="#">Labour in the Agricultural Sector</a>	63
18.1	<a href="#">Motivation</a>	63
18.2	<a href="#">Labour's Welfare</a>	63
19.	<a href="#">Coordination and Collaboration</a>	64
19.1	<a href="#">Strategic Level</a>	64
19.2	<a href="#">Implementation level</a>	64
19.3	<a href="#">Government and private collaboration</a>	65
19.4	<a href="#">Regional and international collaboration</a>	65
19.5	<a href="#">Partnership</a>	65

20. <a href="#">Various Topics</a>	66
20.1 <a href="#">Preserving Intellectual Property rights</a>	66
20.2 <a href="#">Geographic intelligence (GI)</a>	66
20.3 <a href="#">Non-agricultural activities</a>	66
21. <a href="#">The dominance of Bengali language</a>	67
22. <a href="#">Conclusion</a>	67

## Introduction

1.1 Agriculture is the main source of employment and income generation for the rural people of Bangladesh. 41% out of the total labour force is directly engaged in the profession of agriculture. Contribution of agriculture in the GDP is approximately 15%. out of which, 9% is contributed by the crop sub-sectors. Considering the immeasurable importance of the crop sector, under the visible guidance of the father of the Nation Bangabandhu Sheikh Mujibur Rahman, Agriculture Research Council, BADC and several other agricultural institutions were established, and revived and agricultural extension services were widened, and its speed was increased. As a result, the country has achieved self-sufficiency in grain food. Various kinds of fruits and vegetables are being grown along with the increased production of several crops due to introduction of modern varieties and technological development. Similarly, the innovation of biotechnology in this country has led to the cultivation of BT Brinjal, setting up a unique example in the Asian region. Agricultural development is directly related to the country's poverty alleviation. In this policy, importance has been given to poverty alleviation, achieving food and nutrition security and growth of agriculture through modernization of agriculture.

1.2 The contribution of small-scale farmers in national and family-based food security is increasing more and more. In the past, giving importance to the increased production of paddy, wheat and other grains has helped achieve self-sufficiency in the production of major food crops. Emphasis has been given to crop diversification and high yield crop production to achieve nutrition security.

1.3 While formulating the 'National Agricultural Policy 2018', all the contextual laws, policies, development plans, perspective planning etc. has been examined carefully. These included the Seed Policy 1999; National Land Use Policy 2001; National Food Policy 2006; National Livestock Development Policy 2007; Biosafety Guidelines 2008; National Food Policy Work Plan 2008-2015; Country Investment Plan 2011; Plant Quarantine Act, 2011; National Jute Policy 2011; Bio-safety Rules 2012; National Water Act 2013; Food Security Act 2013; Southern Master Plan for Agricultural Development in the Southern Region 2013; National Nutrition Policy 2015, Perspective Planning (2011-2021); Seventh Five Year Plan (2016-2020); Sustainable Development Goals (2016-2030); Bangladesh Delta Plan 2100; Fertilizer Management Act 2017; Jute Act 2017; Integrated Small scale Irrigation Policy 2017; National Organic Agricultural Policy 2017; National Pesticide Control Act 2017; Groundwater Management for Agriculture Act 2018 and Seed Act 2018. As separate policies exist for different sub-sectors under the agricultural sector, and for giving utmost importance to agricultural

development, the ' National Agricultural Policy 2018' has been formulated as titled as such in continuity of previous agricultural development documents.

1.4 Due to Bangladesh's geographical location, the country is prone to disaster and for this reason, continuous innovation and expansion of varieties of stress-tolerant crops and its production is required. For this, it is essential to develop disease and pest-resisting and nutritious crops through biotechnology and other technology and technological innovation. Besides, the introduction of crop zone-based crop production is essential for profitable agriculture. Thus, these two topics have been given special importance in this policy.

1.5 In the context of rapidly decreasing agricultural land, loss of soil fertility and rapidly increasing population, maintaining production growth of several crops is a big challenge. Therefore, it is necessary to give special attention to increasing overall productivity. At the same time, importance needs to be given to technological innovation and expansion with the view to reduce the yield differentiation at farm and field levels research.

1.6 Appropriate collection of marine resources and its diverse use leaves ample scope for improving the quality of life, imports and income growth of the coastal population. If the resources are used in a well-planned manner, then great improvement is possible in the agricultural sector. The production of plankton in seas, rivers and wetlands can play a role in agricultural development. Plankton, besides being the food of aquatic animals, also helps in protecting water environment. Besides, it is used as food and in the medical industry for humans and domestic animals. Besides fish stock, due importance has been given to the subject of moss cultivation because of its existing possibility.

1.7 In the interest of formulating a realistic and effective National Agricultural Policy, existing agricultural conditions have been assessed. The existing benefits of agriculture, such as, favourable production and research-extension methods, suitable technology, the supply network of agricultural inputs, labour-power, interested farmers, crop biodiversity, agriculture friendly policy, help in production and experienced farmers are helpful in agricultural development. On the other hand, improvement in the agricultural education system, promotion of hybrid and of biotechnology,

reduction in yield differentiation, enhancing productivity in adverse conditions, transfer of sustainable technology, farm mechanisation, high yield crop production and imports, crop diversification and intensification, integrated nutrition and pesticides management method, agricultural forestry, commercial agriculture, establishing agricultural industries, women's participation, employment generation, income growth, best agricultural methods etc. are fields that have immense scope for improvement.

1.8 There are some weaknesses as well in the agricultural sector. The lack of desired productivity of the agricultural implements, lack of capital, inadequacy of usable technology in adverse conditions, limited agricultural marketing system, post-harvest losses, little initiative in crop production meant for imports, insufficient farmers' loans and lack of infrastructural facilities, disintegrated agricultural cooperatives, the weakness in the coordination among universities, research institutions and extension department, tardiness in the transfer of technology, lack of dynamism in the agricultural system, fewer opportunities in preservation, supply and processing of agricultural goods, lack useful land zoning, limited investments etc. are the existing weaknesses. In addition, changing climate, rapidly declining agricultural land, environmental degradation, the damaging effect of pesticide residue on the crops, declining biodiversity, reducing soil fertility, use of agricultural land for non- agricultural purposes are other dangers also prevalent.

1.9 Aspects of protecting soil fertility and sustainable environment with the use of bio and chemical fertilizers and use of best agricultural practices have been given primary importance in this policy.

1.10 Importance has been given in this agricultural policy to invest in high-quality seed production, fertilizer and irrigation management, bio-technology, farm mechanization, agricultural cooperatives and marketing, empowerment of women in agriculture, natural resource management, specialized agriculture, area-specific agriculture, the involvement of the youth, agricultural rehabilitation, agricultural forestry, safe and nutrition-rich food production, use of information and communication technology etc for the overall development of the crop sector.

1.11 Emphasis has been given, in this agricultural policy, to increase capacity through training to everyone associated along with motivating the farmers to use bio-agriculture and increase crop production to produce export oriented safe food. Moreover, ensuring the use of information

technology in the agricultural sector for fast expansion services along with creating a strong integrated network of all local and developmental institutions aiding agricultural development has been included in the agricultural policy.

1.12 In the context of climate change, modernization of agriculture is essential to achieve the goals of sustainable development along with increasing capability of confronting multilateral challenges. Alongside risk mitigation, introduction of widespread location-specific crop varieties and sustainable management of natural resources is necessary in this context. Demand for high-quality crops is increasing with changing food habits. With this goal in mind, initiative to ensure continuous agricultural growth through the introduction of yearly performance contract has been adopted. Hence, the existing agricultural policy has been updated keeping in view the present socio-economic background.

1.13 To achieve the goals and objectives of the ' National Agricultural Policy 2018', it is essential to implement, observe and evaluate this policy. With this target, steps will be taken to ensure observation and evaluation of the implementation activities by ascertaining specific short, middle and long-term implementation strategies.

1.14 With the promulgation of " National Agricultural Policy 2018", the "National Agricultural Policy 2013" will be invalidated.



## 2. Goals and Objectives of National Agricultural Policy

### 2.1 Principal goals

To achieve safe, profitable agriculture and sustainable food and nutrition security.

### 2.2 Main Objective

To ensure food security and improvement in socio-economic conditions through crop productivity, increase in the production and income of farmers, diversification of crops, production of safe and nutrients-rich food, improvement in the marketing system, profitable agriculture and efficient utilization of natural resources.

### 2.3 Specific Objectives

2.3.1 To increase the availability, right to and purchasing power of food through increase in crop productivity and production;

2.3.2 For innovations in sustainable technology, modernizing agricultural research, education, extension and input infrastructure and building proficient human resources;

2.3.3 Increase farmer's capability and enhance income with the help of improved institutional infrastructure and efficient technical services;

2.3.4 To adopt and implement nutrition-rich, safe and demand-based food production;

2.3.5 Improving agricultural research and imports in coordination with local and international organisations;

2.3.6 Helping the farmers in agricultural production and ensuring marketing and remunerative prices of agricultural goods;

2.3.7 To build a sustainable agricultural production system with increase in productivity through proper management of natural resources;

2.3.8 Reducing physical labour and introducing affordable agricultural system through farm mechanisation;

2.3.9 Commercialization of agriculture through improvement in demand-based and export-oriented agriculture and create new sectors of employment; and

2.3.10 Active participation in formulating strategy in the interest of suitable utilization of water resources by inter-ministry/inter-organization coordination and implement the same in a proper way.

### 3. Research in Agricultural Development

Innovation in technology through modern research and increase in crop productivity and production through its implementation is necessary. For this purpose, excellence in international agricultural science needs to be utilized to improve knowledge, skill and capability in research. Along with this, priority will be given in the fields of innovation and implementation of crop varieties, adapted with adverse climate, and eco-friendly and nutrient-rich crop breed, reduction in post-harvest losses, encouraging establishment of agro-based industries, preservation of natural resources, increasing skill in the use of land and water, preservation of genetic resources and its use, increase in quality seed supply, increasing irrigation skills, improvement in biotechnology, farm mechanisation, socio-economic aspects among others. Besides, researches on developing nutrient-rich oil seeds and cash crops are crucial.

To confront the various challenges of agriculture, emphasis needs to be given on research and development in the following sectors:

#### 3.1 Improvement in agricultural research management:

3.1.1 Preparation, observation and evaluation of agricultural research planning and strengthening coordination of institutions under the National Agricultural Research (NARS) in a better way;

3.1.2.1.1 Establishing 'National Research Information Centre' to avoid duality in research;

3.1.2.1.2 Adopting measures to attract talented people in agricultural research and acquiring intellectual property rights on innovated technology;

3.1.3 Taking initiatives to establish research centres in critical agricultural locations with the aim of innovating area-specific agricultural technology; and

3.1.4 Introduction of improved research methodology in NARS-affiliated institutions and universities and taking steps to achieve highest social benefits and value addition by investing in research.

## 3.2 Planning and Financing

- 3.2.1 Selecting priority sectors in the short term (1-5 years), mid-term (6-10 years) and long term (11-15 years) researches in accordance with national demand;
- 3.2.2 Taking measures to provide recognition and motivation to the innovative works of the scientists nationally/institutionally;
- 3.2.3 Taking steps to continuously increase the knowledge and skill of the scientists to strengthen the foundation of agricultural research;
- 3.2.4 Emphasising on the field-level requirements in research planning and priorities;
- 3.2.5 Promoting interest in research activities through participation of government/private organisations and universities; and
- 3.2.6 Coordination and financing for timely execution of research activities

## 3.3 Research areas and sectors:

- 3.3.1 Improvement in Breeds:
  - 3.3.1.1 Giving importance to modern research to remove the limitations in the prevalent methods;
  - 3.3.1.2 Strengthening hybrid and mutation breeding activities for highly productive, nutrition-rich, affordable and healthy crop varieties and, increasing the area and sector of molecular breeding along with the prevalent reproduction methods;
  - 3.3.1.3 Strengthening the activities of improving crop breeding to produce crops to fight sudden flash floods in advance, cold tolerant and light-sensitive;
  - 3.3.1.4 More activities in improving nutrition quality of major crops through bio-fortification;
  - 3.3.1.5 Strengthening research activities in institutions under NARS for innovation in shock-tolerant varieties and technology;
  - 3.3.1.6 Inspiring locally prevalent/non-prevalent crop development activities based on popular and specific consumer demand;
  - 3.3.1.7 Strengthening research activities in innovating grain, wheat, jute etc. tolerant to adversity, salinity and drought;

3.3.1.8 Accelerating research in the development of non-prevalent cultivable nutrition-rich non-prevalent crops (such as Kaun, China, Arhar, Sargam, Barley, Felon, Black Potatoes, Potatoes) in adverse conditions;

3.3.1.9 Strengthening research in jute and jute-based goods production;

3.3.1.2 Strengthening research activities in jute and other crops in consistency with unveiling jute's gene format;

3.3.1.3 Undertaking activities to use solar energy for increasing the ability of photosynthesis for crop production in coordinating with and support of national and international agricultural research.

### 3.3.2 Biotechnology Research:

3.3.2.1 Undertaking activities in the research of identifying genes agricultural characteristic of high yielding and other desirable varieties and adopting transfer of research activities;

3.3.2.2 Strengthening research activities in breaking the present yield ceiling;

3.3.2.3 Further accelerating research activities in genomics to develop crop varieties suitable to adverse conditions;

3.3.2.4 Taking initiatives to establish gene bank of agricultural crops and establish and preserve database; and

3.3.2.5 Motivating the scientists to undertake research activities regarding invention and utilization of shock-tolerant methodology for crops.

### 3.3.3 Nano Technology:

3.3.3.1 Initiating the use of nanotechnology in detecting crop disease at a primary level, ascertaining crop variety-based nutrition demand and increasing nutrition accumulation capability;

3.3.3.2 Undertaking activities to observe soil quality and increase production by using nano-sensor technology; and

3.3.3.3 Taking initiatives to identify the presence of heavy chemicals in agriculture and rectify it along with achieving efficiency by innovation and use of fertilizers and pesticides of nanotechnology.

#### 3.3.4 Genetic Resources:

3.3.4.1 Enhancing the activities of collection, preservation, reproduction, exchange, evaluation and documentation of national and foreign genetic resources institutionally;

3.3.4.2 Undertake initiatives to increase proper physical and technical opportunities in genetic resources preservation;

3.3.4.3 Conduct monitoring activities to protect crop diversity, prevent losses and extinction to genetic resources, and undertake measures stop illegal trading;

3.3.4.4 Creating a scientific database of information of genetic resource evaluation and using it for development of crop varieties; and

3.3.4.5 Encouraging exploration and usage of specific desired characteristics of preserved genetic resources.

#### 3.3.5 Research on microorganisms:

3.3.5.1 Emphasis on identification, characterisation and selection of developed varieties of important microorganisms in agriculture;

3.3.5.2 Undertake research activities regarding increased effectiveness of microorganisms; and

3.3.5.3 Encouraging everyone associated to establish agriculture-based microorganism research industry.

#### 3.3.6 Climate Change, shock-tolerant varieties and technology:

3.3.6.1 Strengthening activities to ascertain the impact of climate change on different crops and natural resources;

3.3.6.2 Promoting research activities on technological innovation of crop production and cropping pattern with lesser emission of greenhouse gases;

3.3.6.3 Accelerating research activities on technological innovation of affordable and profitable cultivation practices suitable to adverse conditions;

3.3.6.4 Accelerating fruitful technological innovation soil-water-fertilizer-crop management suitable to adverse conditions; and

3.3.6.5 Encouraging/supporting the participation of private organisations in innovating shock-tolerant varieties/technology/management.

3.3.7 Cash-crops, high value and horticultural crops and resultant nutrition:

3.3.7.1 Technological innovation on cultivation of high yield variety, nutrient-rich, short-term, less ingredient-dependent crop varieties, depending on the demands of local and export market;

3.3.7.2 Identification of methodology for the introduction, development and management of cultivable of national-international fruits/vegetables/flower varieties;

3.3.7.3 Promoting research activities regarding innovation of hybrid methods to produce varieties of vegetables, spices, flowers, leaves, fern and other beautifying plant species and extending preservation time, processing, packaging and transportation;

3.3.7.4 Giving special importance to innovation of early seasonal and yearly crop varieties with a view to increase availability of fruits;

3.3.7.5 Undertaking research activities on crops and technological innovation suitable for hilly areas;

3.3.7.6 Undertaking research activities in the innovation for high yielding new varieties of mustard, canola, sesame, linseed, sunflower etc;

3.3.7.7 Undertaking activities in special research of trees with medicinal properties, improvement in creeper/bush, production and processing; and

3.3.7.8 Strengthening food-based resultant nutrition research in improving the level of nutrition, increase in the diversity of nutrition in food and quality preservation to achieve nutrition security.

3.3.8 Natural Resources Management Related Research:

3.3.8.1 Discouraging the use of cultivable land for establishing settlements and, as an alternative, encouraging one house one farm, shelter/cluster villages/ growth centres etc.;

3.3.8.2 Strengthening research for monitoring changes in land quality and increasing the soil fertility and its preservation;

- 3.3.8.3 Further strengthening research in determining amount of fertilizers by estimating soil fertility at the local level;
- 3.3.8.4 Strengthening research on problematic soil management;
- 3.3.8.5 Strengthening research on balanced and skilled use of natural resources; and
- 3.3.8.6 Accelerating the process of exploring availability/quality of area-based natural resources to ensure profitable crop productions through research on crop modelling.
- 3.3.9 Unconventional and off-season crops:
  - 3.3.9.1 Strengthening activities in developing nutritious unconventional/off-season crops; and
  - 3.3.9.2 Undertaking special research programs for producing unconventional and off-season crops and increasing value addition
- 3.3.10 Developing efficiency of agricultural implements:
  - 3.3.10.1 Undertake research activities regarding technique of enhancing availability of new, potential and popular seed varieties;
  - 3.3.10.2 Strengthening research in quarantine period in the development of overall seed management system and seed carrying diseases;
  - 3.3.10.3 Adopting measures to research in the applicability of new irrigation measures to increase effectiveness and productivity;
  - 3.3.10.4 Effective steps are taken to research on new innovative methods to improve irrigation skills.
- 3.3.11 Innovating technology in cultivation and caring
  - 3.3.11.1 Emphasising on the innovation of profitable cultivation methods of innovated or introduced crops;
  - 3.3.11.2 Undertaking research activities on technological assistance to obstacle-free varieties, and ensuring the availability of information;
  - 3.3.11.3 Strengthening research with the aim of organic cultivation crop-wise and innovation of crop caring technology; and

3.3.11.4 Conducting on-farm research activities at the farmer's level with the aim of innovating successful cultivation and caring technology.

#### 3.3.12 Crop Zoning

3.3.12.1 Increase production with the help of modern technology, like collecting land and soil-related data and information by using GIS and Remote Sensing, and using crop zoning based on local climate, geo-physical and socio-economic conditions;

3.3.12.2 Undertaking research activities on evaluating and developing productivity based on crop zoning; and

3.3.12.3 Taking steps to encourage the farmers to use crop zoning for growth in production and income.

#### 3.3.13 Pest management

3.3.13.1 Undertaking research activities to identify new pests and explore eco-friendly pesticides;

3.3.13.2 Strengthening research on developing effective pest-control system;

3.3.13.3 Encouraging research in development and usage of bio-pesticides;

3.3.13.4 Undertaking research activities on observation/monitoring and management of trans-border pests on a regular basis;

3.3.13.5 Taking steps to increase research/training/awareness on safe use of pesticides; and

3.3.13.6 Taking steps to ascertain the use of maximum residue level (MRL) after use of authorized pesticide.

#### 3.3.14 Research on Farming System:

3.3.14.1 Executing research activities in improving the skilled use of areas adjacent to farmland (courtyard, roof, bank of the pond etc.) for increasing aggregate income of the farmer;

3.3.14.2 Undertaking research activities for introduction of location-specific nutrition-rich and profitable crop section along with improvement in the prevalent crop cycles;



3.3.14.3 Strengthening research on the interconnected relationship of crop-water-fish-agricultural forestry and increase productivity; and

3.3.14.4 Strengthening research activities on countrywide farming system to identify/extend ingredients-saving and profitable cropping pattern with the inclusion of possible stakeholders.

3.3.15 Post-harvest Technology:

3.3.15.1 Strengthening research and development of crop harvesting, processing, handling, transporting, packaging and storing;

3.3.15.2 Prioritize research and development activities regarding reducing post-harvest crop losses; and

3.3.15.3 Giving preference and encouraging construction of crop-based godowns, air-conditioned godowns and multipurpose cold storages for maintaining the quality of produced crops to meet local demands.

3.3.16 Diversification and intensification of crops and reducing yield differentiation:

3.3.16.1 Strengthening research on crop diversification for the purpose of consumer demands, nutrition supply, land fertility and increasing income;

3.3.16.2 Strengthening research activities related to the use of both relay and mixed cropping methods for increasing income of farmers;

3.3.16.3 Taking measures for crop diversification through encouraging and strengthening research on improving soil-water-crop management to reduce yield differentiation; and

3.3.16.4 Accelerating the research activities regarding enhancing intensification and diversification of crops to increase the fertility of the soil and farmer's income.

3.3.17 Research on Agricultural Mechanisation:

3.3.17.1 Emphasis on developing cost-saving inputs/power-saving machines in the innovation of agricultural machines;

3.3.17.2 Strengthening research on enhancing use of renewable fuel for irrigation/agricultural machineries;

3.3.17.3 Encouraging production and innovation of affordable agricultural machineries consistent with the socio-economic condition of the farmers; and

3.3.17.4 Strengthening research on making imported agricultural machineries usable after examining their utility.

3.3.18 Socio-economic Research:

3.3.18.1 Prioritize policy research on analysing socio-economic constraints in the efficient use of crop zoning, crop diversification, technology transfer and agricultural implements by evaluating the socio-economic impact of agricultural technology, analysing consistency in agricultural production, market value, farmer's income, supply of inputs, reduction in yield differentiation, and production assistance;

3.3.18.2 Strengthening research on examining suitability/acceptability of agricultural technology with feedback from the farm level;

3.3.18.3 Strengthening market research with the view to ease the marketing of quality agriculturally produces;

3.3.18.4 Undertaking research activities on matters related to proper land utilization, cropping pattern and crop acceptability by investigating classification of ownership, amount, location and causes of fallow land; and

3.3.18.5 Encouraging macro and micro-level study related to the production of agricultural goods and marketing.

3.3.19 Strategy of spreading technology:

3.3.19.1 Taking initiatives to involve scientists in the programmes of outdoor expansion activities under NARS organisations;

3.3.19.2 Emphasis to be given by research organizations on matters of refinement, checking and transfer of technology by improving mutual bonding with the stakeholders.

## 4. Transfer of Technology and Agricultural Extension

It is important to develop appropriate agricultural extension service and institutional capability to achieve nutrition security and agricultural commercialization through transfer of technology with the aim to ensure sustainable agricultural production methods. The agricultural extension services provider organizations will provide advice to the farmers regarding appropriate techniques and farm management information, technology and advice with the aim to increase production, income and capability of the farmers. To make agricultural extension services more efficient and effective, the main objectives, communication methods and necessary steps are mentioned below:

### 4.1 Main objective of extension:

- 4.1.1 Providing demand-based extension services to farmers of all classes (landless, marginal, small, middle and large farmers);
- 4.1.2 Undertaking concrete initiatives to make women and youth skilled and interested with a view to attract them towards agriculture;
- 4.1.3 Encouraging participation of private and voluntary organizations in agricultural extension services;
- 4.1.4 Developing and expanding city-based agricultural extension services;
- 4.1.5 Diversifying and decentralizing extension activities to provide skilled and coordinated services at the doorsteps of the farmers.
- 4.1.6 Making the extension staff more skilled and capable to deal with natural disasters;
- 4.1.7 Taking effective measures in formulating and implementing demand-based seasonal and yearly production plans; and
- 4.1.8 Achieving coordination in sustainable, profitable and cost-saving production and marketing of crops.

### 4.2 Method of Communication:

- 4.2.1 Undertaking measures to strengthen extension services through the local/regional/national level Agricultural Technology Extension Coordinating Committees (ATECC), which have been established combining the research and extension institutions;
- 4.2.2 Measures will be taken to update and implement extension activities according to the decisions of extension coordinated committees regarding

agricultural area-specific invented varieties/ technology and in case of replacing new varieties with old ones;

4.2.3 An evaluation method will be formulated for ensuring inclusion of all related to technology extension exhibitions, along with consumer demands and other matters.

4.2.4 Necessary advice will be given to the research institutions to achieve technological development by reviewing utility of technology used basing on field evaluation;

4.2.5 Ensuring participation of all associated with workshops, meetings, monitoring etc. with the aim to strengthen agricultural research and extension and help each other's knowledge to be enriched and effective;

4.2.6 To encourage farmers to cultivate crops following the fertilizer recommendation guide formulated on the basis of land quality;

4.2.7 To ensure need-based sustainable technology extension through improving relationship between research-extension-farmer;

4.2.8 To ensure uninterrupted technology extension through the establishment of Upazila-based agricultural technology transfer blocks;

4.2.9 Investigating and implementing new sectors of group/community-based extension services;

4.2.10 The local extension staff will play the role of primary source of information supply and giving advice;

4.2.11. Popularizing extension services by organizing 'farmer schools', 'Farmer's rally', 'Field Day' etc. through increased connection with the farmers;

4.2.12 Ensuring e-agriculture extension services with the aim to extensively use modern information and communication technology and mass media in a greater way to extend technology; and

4.2.13 To make extension services effective, 'Farmers' interest is primary' will be considered foremost, and to strengthen extension, 'Lab to Land', 'Science to Society', 'information friendly/technological agent' and several innovative extension strategies will be undertaken.

### 4.3 Areas of Extension

- 4.3.1 Implementing climate and area-specific cropping pattern and extension activities to increase sustainable production;
- 4.3.2 Encouraging production and management of quality declared seed (Truthfully Labelled Seed or TLS) at the farmer's level;
- 4.3.3 Undertaking activities in developing jute cultivation through extension of improved varieties of jute seeds;
- 4.3.4 Strengthening suitable extension services with the aim to increase high-valued crop diversification and intensification;
- 4.3.5 Special emphasis on crop production and extension activities on safe gardens/fields by best cultivation practices for fruit production throughout the year for the sake of nutrition security;
- 4.3.6 Rapid extension of innovated technology in reducing yield differentiation in the field production along with fighting production risks;
- 4.3.7 Accelerating extension of suitable technological services to preserve environment by reducing use of groundwater for agriculture and better management of land and water;
- 4.3.8 Giving special importance to production of crop varieties like pulses, oil (mustard, canola, sesame, linseed, sunflower etc.) and spices to ensure farmer's income and nutrition security;
- 4.3.9 Strengthening extension activities at the farmer's level for cultivation of jute varieties developed through research;
- 4.3.10 Extending use of bio/green/bacterial fertilizers to protect soil health and prioritizing production techniques;
- 4.3.11 Strengthening agricultural mechanization related services and fast extension of agricultural goods processing technologies;
- 4.3.12 Taking steps to increase the infrastructural and technical capabilities of government organizations associated with providing innovative and effective extension services and enhance technical capability of concerned non-government organizations; and

4.3.13 Taking steps to increase income through partner, mixed, relay and intercropping cultivation along with the extension of fruit gardens.

#### 4.4 Inclusive Participation:

4.4.1 Encouraging participation of government and private sectors in demand based technological extension for production, preservation and marketing of agricultural goods at the national, local, district, Upazila and union levels;

4.4.2 Strengthening collaborative activities between NARS affiliated institutions, extension institutions, private institutions and universities for adaptable research and extension;

4.4.3 Adopting strategies to provide extension services at union and Upazila level with the help of local governments;

4.4.4 Activities will be undertaken to replace farmer's seeds with quality seeds; and

4.4.5 Encouraging local people and farmers to participate in selecting potential crop varieties and applied researches.

#### 4.5 Tackling disaster and secure crops:

4.5.1 Special emergency services will be provided in the extension of demand-based new agricultural technology during a disaster;

4.5.2 Disaster-prone areas, char areas, fallow and uncultivated lands will be brought under special agricultural activities;

4.5.3 Improved technological extension services to be provided in adverse conditions in a coordinated way;

4.5.4 Complete destruction of crops infected by dangerous pest and prevention of seed collection from the infected crops;

4.5.5 Assistance will be provided to the farmers in agricultural implements to face calamities and rehabilitate farming; and

4.5.6 The systems of forecasting natural disasters will be developed and through this crop protection activities will be taken up.

#### 4.6 Local Knowledge/technology and Experience:

4.6.1 After acknowledging and evaluating adaptable local technology/knowledge, measures will be taken to improvise and spread the same;

4.6.2 Undertake initiatives to extend adaptable techniques, attained from area-based research, and take initiatives to increase local high-value crop production and pursue profitable cropping pattern; and

4.6.3 Strengthen activities to increase crop production by using local agricultural techniques suitable for risk-prone areas.

#### 4.7 Farmers' Group/ Club:

4.7.1 Encouraging people to form area-based farmer's club/groups and inspiring them to adopt technological services;

4.7.2 Encouraging farmers in instant problem solving through Integrated Pest Management (IPM), Integrated Crop Management (ICM), Farmer's Information and Advice Centre (FIAC) etc.

4.7.3 Encouragement will be given through farmer's clubs for exigent production/input aid/ motivation;

4.7.4 Farmers' Mechanization Groups will be formed for distributing agricultural implements to aid development; and

4.7.5 Involving the existing groups in providing the e-agricultural services.

#### 4.8 Crop technology:

4.8.1 Inspiring the farmers to produce improved seeds and use it through the season-based opinion-exchange meetings/trainings of the interested farmers with the help of seed-producing firms; and

4.8.2 Encouraging exchange of seeds amongst farmers with the aim of extension of standard and good quality seeds.

#### 4.9 Ensuring standards of seeds and crops:

4.9.1 Measures will be taken to eradicate germs and diseases during production, processing and marketing of crops; and

4.9.2 Strengthening quarantine services according to the demands of import and export markets.

## 5. Agricultural Inputs

It is especially important to ensure supply of standard inputs to achieve agricultural growth. The price of urea and other chemical fertilizers have been kept within the purchasing power of the farmers through massive development aids to ensure balanced use of fertilizers. Farmers are being encouraged all the time to use balanced fertilizers by testing the fertility of soil for the sake of protecting soil health and increasing importance is being given to the use of biofertilizers. An integrated pest management system has been adopted to ensure production of safe food. Steps have been taken to ensure efficient irrigation management. Through implementation of the following programmes, development of skills to use agricultural implements and protection and management of environment will be ensured:

### 5.1. Seeds, saplings and Grafting:

At present, a considerable proportion of quality seeds for different demand-based crops is supplied by the government. The private seed producing firms are involved in the main in supplying hybrid varieties of paddy, corns and vegetables. The following steps will be taken to develop and supply seeds, saplings and grafting:

#### 5.1.1 Developing and Maintaining of Seed Management

5.1.1.1 Encouraging the government and private organizations, individuals/companies in seed production and imports with the aim to development and increase crop seeds;

5.1.1.2 Encouraging private firms alongside the public firms in the production/marketing of seed varieties invented by government research institutions;

5.1.1.3 Maintaining the standard of approved seed management from production to marketing in the public and private sectors under the direct guidance of Seed Certification Agency;

5.1.1.4 Subject to prior approval of the Government, any private individual or organization can be associated in programmes related to improvement, registration, import, export and marketing of seeds;

5.1.1.5 To fulfil the demands of outdated crops, measures will be taken to increase the capability of producing reproductive/base seeds by the seed innovating organizations;



5.1.1.6 Encouraging the public and private sectors in the activities of production, processing, preservation, quality control and marketing of seeds;

5.1.1.7 Taking effective initiatives to increase the institutional capability regarding plant quarantine in the import/export of seed/saplings/plant-grafting and follow related rules;

5.1.1.8 Increasing the availability of seeds at a local level through establishing seed villages by coordinating farmers and entrepreneurs, trained and organized in quality seed production and preservation; and

5.1.1.9 Undertaking initiatives to follow policies for contractual farmers in standard crop production, preservation and quality control and increase the efficiency of farmers.

#### 5.1.2 Seed multiplication/germination, distribution and seeds industries

5.1.2.1 Emphasizing on reproduction for more availability of certified and standard seeds and germination of base seeds;

5.1.2.2 Encouraging all the breed innovating/seed germination organizations to build stock of seeds for critical situation;

5.1.2.3 Giving aid as much as possible in making certified seeds available to farmers through public and private seed-producing organizations;

5.1.2.4 Increasing the capability of contractual farmers to produce quality seeds in the public and private sector;

5.1.2.5 Undertaking initiatives to regularly train farmers related to seed production, processing and preservation through public and private institutions; and

5.1.2.6 Encouraging production and distribution of standard saplings, grafting and seeds for horticulture crops.

## 5.2 Fertilizers (Chemical, Organic and Bio):

The following steps will be followed to strengthen fertilizer management:

5.2.1 Collection, preservation, distribution, standard monitoring and supervision:

5.2.1.1 Continuing the program of providing developmental aid to keep prices of fertilizers within the purchasing power of farmers;

5.2.1.2 Conducting intense monitoring at all levels to strictly control the approved standards of fertilizers and to supply, storing and ensuring the price and quality of the same;

5.2.1.3 Building stocks of fertilizers in local, district and Upazila level for emergency situations;

5.2.1.4 Bringing all activities under digital methods through strengthening the institutional opportunities of quality analysis at local levels;

5.2.1.5 Identifying strategic locations and ensuring necessary stock of fertilizers at those locations by building infrastructures to store fertilizers; and

5.2.1.6 Inspiring the farmers to use more balanced fertilizers, especially those having several nutrition.

#### 5.2.2 Organic, green and bacterial fertilizers:

5.2.2.1 Encouraging the use of green /organic fertilizers to increase soil fertility and using bacterial fertilizers for varieties of pulses;

5.2.2.2 Encouraging the commercialization and marketing of bacterial fertilizers invented through research;

5.2.2.3 Encouraging the farmers through training in the use of balanced use of organic and chemical fertilizers;

5.2.2.4 Increasing the availability of organic fertilizers and encouraging domestication of cattle for the sake of usable renewable fuel in households; and

5.2.2.5 Especially motivating production and use of green, organic and bio fertilizers.

### 5.3 Pest eradication and pest control management

5.3.1 Extension departments and NARS affiliated institutions will monitor throughout the year the presence of crop-based pests and damages caused regularly;

5.3.2 Strengthening the activities of pest control inspection, registration, marketing and monitoring;

- 5.3.3 Discouraging the use and import of pesticides which causes damage to the useful insects;
- 5.3.4 Creating awareness regarding evasion of pesticide-related accidents and of treatment services amongst associated extension staff, farmers/dealers;
- 5.3.5 Encouraging the farmers to use organic fertilizers; and
- 5.3.6 Encouraging the import of the World Health Organization advised Tier 3 affiliated eco-friendly, safe and effective pesticide.

#### 5.4 Irrigation and water management:

Increasing use of surface water and the best use of limited groundwater to maintain environmental balance and reduce irrigation cost has special importance. The activities of digging canals, wells, establishing rubber dams in small and medium-sized rivers and other activities are continuing to increase the availability and usage of surface water. Preference has been given to rainwater harvesting in the monsoon along with preservation of groundwater with the aim to increase the level of underground water and having enough water in dry seasons for irrigation purposes. Initiatives have been taken to increase crop productivity and crop intensification by the inclusion of irrigation-saving crops and new cropping patterns. To introduce efficient irrigation system and irrigation-saving facilities, the following measures will be adopted:

##### 5.4.1 Irrigation efficiency and water productivity:

- 5.4.1.1 Using pipelines instead of irrigation channels in irrigation works in all possible areas for judicious use water resources, subject to estimating availability of water;
- 5.4.1.2 Increasing irrigation efficiency in order to improve the usefulness and productivity of water to ensure judicious use of water resources;
- 5.4.1.3 Prioritizing irrigation by using surface water resources, wherever available, and undertaking activities to extend the use of sustainable water-saving technology; and
- 5.4.1.4 Emphasizing balanced use of surface and groundwater and encouraging cultivation of low water consuming crops in drought-prone areas.

#### 5.4.2 Planning and Monitoring:

5.4.2.1 Evaluating availability of ground/surface water and working out an irrigation management zoning plan for the entire country considering the future demand of location and sectors according to their geological and geographical characteristics;

5.4.2.2 Using an appropriate balanced water model to determine the demands of water of agriculture and other sectors, in view of the quantity of surface and groundwater, recharge and future irrigation extension;

5.4.2.3 Regular updating and forecasting by analysis all information regarding the quality of groundwater, mapping of aquifer-related observation and characteristics, functioning of water management, seawater levels and intrusion of saline water; and

5.4.2.4 Establishing 'water management organizations' in association with and participation of local beneficiaries of water management.

#### 5.4.3 Preservation and Usage:

5.4.3.1 Taking the necessary steps to increase availability of surface water through rainwater harvesting/preservation;

5.4.3.2 Ensuring best use of water through construction of ground/surface water channels and sustainable irrigation infrastructure, and wells and ribbon pipes;

5.4.3.3 Reducing irrigation cost and increasing efficiency in use of water and through the introduction of the pre-paid meter in the use of groundwater;

5.4.3.4 By expanding areas under supplementary irrigation, increase the cultivation of Aush, Amon and vegetables, and enhance productivity through the introduction of water-saving new crop varieties;

5.4.3.5 Undertaking initiatives to make the water used in industrial sector usable for irrigation by recyclable method;

5.4.3.6 Undertaking initiatives to implement re-excavation of canals, lakes, drains, ponds and waterbodies with the aim of surface water preservation, draining and appropriate use with the help of associated ministry/organizations;

5.4.3.7 Adopting lifting and management technology of underground water along with creating awareness in water crisis areas to make the best use of water;

5.4.3.8 Encouraging harvesting and preservation of rainwater in wells and utilize the same for domestic/irrigation purposes with the aid of solar energy; and

5.4.3.9 Protecting irrigation water and increasing use of the same by establishing rubber dams on small and medium-sized rivers and other kinds of innovated dams.

#### 5.5. Energy for irrigation:

5.5.1 Taking measures to supply electricity at affordable rate for irrigation machines on priority basis;

5.5.2 Providing development aid for fuels used for irrigation machineries in probable sectors;

5.5.3 Encouraging the use of solar energy along with other renewable energies for irrigation purposes;

5.5.4 Encouraging the use of solar cells/panels manufactured in the country/imported for irrigation purposes and providing credits and motivation for the same; and

5.5.5 Ensuring the best use of solar energy by using it as alternative energy at times other than irrigation seasons, apart from using it only for irrigation purposes.

#### 5.6 Ownership of small-scale irrigation and farm loans:

1. Encouraging joint ownership of irrigation machineries;

2. Taking steps to provide crop and season-based loans to increase the interest of small and middle farmers in cultivation; and

3. Taking steps to waive off interest on farm loans of farmers affected by disasters and providing aid and loans again for production.

## 6. Farm Mechanisation

Although the use of agricultural machineries in ploughing, pest management and crop threshing has remarkably increased, still there is scope to enhance its extent. Besides, the use of machineries in sowing and crop harvesting is not substantial. The following steps will be taken to accelerate the mechanisation activities in order to save time, increase production, reduce cost and increase efficiency of production: --

- 6.1 Giving emphasis to develop and use of environment and user friendly small/micro agricultural machineries;
- 6.2. Providing necessary support to the industrial and manufacturing units producing appropriate indigenous agricultural machineries;
- 6.3 Increasing opportunity to examine and appraise the quality of agricultural machineries and providing assistance in developing skilled workforce at the village levels and;
- 6.4 Taking steps to supply machineries at affordable prices to accelerate and popularize farm mechanisation and provide necessary loans to the producers and users;
- 6.5 Enhance farm mechanisation through stimulating incentives in areas facing natural calamities;
- 6.6 Strengthening the monitoring activities to maintain the standards of agricultural machineries, made in the country, along with the imported ones to achieve sustainable farm mechanisation; and
- 6.7 Forming integrated farm mechanisation service providers' entrepreneurship/groups at the local levels and providing them all round support by supplying necessary agricultural machineries.

## 7. Knowledge and Capability Development

Human resources are essential in the development of appropriate technological innovation, institutional skills and entrepreneurship. Skilled human resources can be developed through introduction of trainings at workplace and felicitations for important contributions. Besides, to achieve professional skills, implementation of appropriate training and teaching package-based work plans will accelerate the agricultural development programmes. The following activities will be undertaken to develop knowledge and skills:

## 7.1 Development of Human Resources:

### 7.1.1 Training Partners:

7.1.1.1 Bringing everyone associated with agricultural development under training including agricultural researchers, extension experts and extension staff; and

7.1.1.2 Arranging regular trainings for all concerned to maintain high quality, professionalism and high standard.

### 7.1.2 Sectors of training:

7.1.2.1 Providing training in the application of new innovations in the agricultural sector and research along with all other matters;

7.1.2.2 Arranging season/crop-based training apart from providing training to farmers' groups;

7.1.2.3 Providing training in matters related to safe food production, crop diversification, integrated pest/nutrition management etc;

7.1.2.4 Prioritize training of women and youth aimed at attracting them to agricultural activities; and

7.1.2.5 Providing training to the scientists and extension staffs in matters of modern scientific knowledge, skills and technology (GIS, remote sensing, crop modelling, information and communication method etc.).

## 7.2 Transfer of Technology:

7.2.1 With the objectives to resolve specific problems and to accelerate technology transfer, extension skills will be achieved through arranging regular workshops, seminars, opinion exchange meetings and trainings by the NARS-affiliated institutions with the participation of extension workers;

7.2.2 Special activities will be undertaken by the innovation centres primarily in the rapid extension of the newly invented technology and will improve the same after evaluating its utility; and

7.2.3 For innovation of effective technology transfer methods, the researchers and the extension experts will adopt joint research planning and will implement.

### 7.3 Areas of Training:

#### 7.3.1 Skill development:

7.3.1.1 Continuously developing scientific, technological and management skills and institutional capabilities;

7.3.1.2 Providing higher education and training to the scientists in evolving scientific knowledge, keeping in view the contexts of climate change, adaptation and disaster mitigation;

7.3.1.3 Conducting regular professional training on improving research management skills, resource utilization technique management, preparing plans, implementation, observation, evaluation etc;

7.3.1.4 Increasing institutional capabilities to ensure trainings at national and international standards after identifying areas lacking skill;

7.3.1.5 Accelerating development/exchange of knowledge and skills through increasing contact between research-extension-agriculture and between educational institutions and farmers;

7.3.1.6 Providing fortnightly training to field level extension workers by defining training requirements and creating Upazila level training manual;

7.3.1.7 Training farmers and all others to increase sustainable natural resource management and skills;

7.3.1.8 Increasing the skill of all participants in matters of technology extension, reducing harvest losses, information and communication technology, crop modelling, molecular breeding, safe food, estimating demand, value addition, salinity/drought/waterlogging management, existence of pesticides, commercial agriculture, seed management, intellectual property rights etc; and

7.3.1.9 Arranging special trainings in order to reduce knowledge-gap and yield differentiation at the field and research levels.

#### 7.3.2 Employment creation:

7.3.2.1 With the aim to increase employment generation, providing encouragement and training to the youth and private entrepreneurs in using agricultural machineries, servicing/repairing by hiring, cultivation of high



value crops, water management, processing, agricultural business, contract farming, transportation of agricultural goods, developing and nourishing fruit gardens;

7.3.2.2 Providing necessary training to the private and public entrepreneurs and farmers in matters of sapling/grafting production, nursery business, seed production, preservation, quality control, and seed marketing/trading management; and

7.3.2.3 Encouraging entrepreneurship and enhancing farmers' income by providing training in preparing organic fertilizers and vermicompost.

### 7.3.3 Stimulation and Incentives:

7.3.3.1 Institutionalizing award-giving for encouraging and acknowledging attainments of excellence in education and training, research, extension, crop production and agricultural development activities; and

7.3.3.2 Undertaking initiatives to provide special incentives to attract meritorious students to and retain them in agricultural profession.

### 7.3.4 Knowledge:

7.3.4.1 Giving emphasis on contemporary education and practical knowledge;

7.3.4.2 To improve the standard of diploma education, introduction of syllabus according to the demands of field-oriented skilled extension services and increase the capability of public and private institutions;

7.3.4.3 Creating opportunities for higher education in agriculture and taking steps to revise the syllabus regularly basing on demands;

7.3.4.4 Specially promoting pursuance of higher studies on local and national agricultural problems;

7.3.4.5 Adopting measures to make the National Agricultural Training Academy into a Centre of Excellence for increasing capability and developing human resources;

7.3.4.6 Adopting necessary measures to prioritize subjects like emerging modern science and knowledge, food and nutrition, changing climate, adaptation strategy etc. in agricultural studies.

#### 7.3.5 Innovation:

7.3.5.1 Encouraging innovating activities in all respects to accelerate agricultural development;

7.3.5.2 Undertaking initiatives to institutionalize motivating and acknowledging innovations in developing skills in research, extension, knowledge, technology and agricultural inputs.

## 8. Agricultural Environment and Natural Resource Management

Agricultural production is largely dependent on appropriate agricultural environments and management of productive natural resource. The following steps will be taken to ensure scientific use of sustainable natural resources according to environment to achieve food and nutrition security:

### 8.1 Agricultural environment and Natural Resource Management:

8.1.2 Discouraging the use of farmlands for non-farm purposes with the aim to ensure sustainable food security;

8.1.2 Undertaking initiatives to increase agricultural land through recovering waterlogged lands and coastal lands near the sea;

8.1.3 Strengthening activities to increase ingredient saving/shock-tolerant crop cultivation as a special measure in increasingly saline and other adverse areas along with mitigation and adaptations;

8.1.4 introduction of locally suitable crops and adopting steps for soil preservation in the use of hilly lands in agricultural work;

8.1.5 Adopting initiatives for preservation and effective use of soil, water, plants, fauna and overall environment;

8.1.6 Undertaking initiatives to implement the policies, planning and strategies pronounced by the government in reducing the risk of disasters;

8.1.7 Taking steps to include matters related to climate change, adaptation and risk mitigation during disasters in the main policy and planning of government and make them effective; and

8.1.8 Adopting policies and planning with the aim to create “Disaster Risk Management Funds” under the Ministry of Agriculture.

## 8.2 Changing climate and agriculture:

### 8.2.1 Eco-friendly technology:

8.2.1.1 Encouraging and motivating all concerned in the use of eco-friendly technology for sustainable production;

8.2.1.2 Welcoming initiatives of private and international organizations in infrastructural development and socio-economic rehabilitation in disaster-prone areas; and

8.2.1.3 Taking initiatives to grow healthy and vigorous saplings in a controlled environment to confront adverse conditions.

### 8.2.2 Preservation of environment and natural resources:

8.2.2.1 Pursuing integrated nutrition/pest/crop management in sustainable natural resource management/preservation;

8.2.2.2 Encouraging the farmers to preserve nutritious traditional and non-traditional crops through cultivation;

8.2.2.3 Providing assistance in making compost fertilizer through kitchen waste management in municipal areas;

8.2.2.4 Taking necessary steps to preserve microorganisms in soil and encouraging the use of minimum ploughing method and;

8.2.2.5 Adopting steps to increase and preserve organic contents of soil through recycling of compost/vermicompost, farm-produced fertilizers, chicken’s excrement, decomposed plant waste and crop residue and by use of “Bio-slurry and Bio-char” methods;

8.2.2.6 Taking effective measures in creating awareness about environment protection and soil health and preventing arsenic and other heavy metal pollution;

8.2.2.7 Encouraging pest control by changing sowing/harvesting time of crops, light trap, trap crops, pest-resistant varieties, and use of sex pheromone etc.;

8.2.2.8 Taking steps of rearing, breeding and extension/use of helpful insects at the farmer's level;

8.2.2.9 Encouraging development and use of biopesticides locally by using plant by-products and nonharmful local raw materials;

8.2.2.10 Strengthening methods to regulate use of polluting materials in irrigation water sources;

8.2.2.11 Pursuing treatment methods to reduce the use of weed killers and creating awareness about the use of microorganism and natural enemies in eliminating and controlling weeds;

8.2.2.12 Strengthening caution in the use of pesticides for preserving natural resources and sustainable environment and monitoring activities in preventing adulteration in agricultural ingredients and;

8.2.2.13 Encouraging the use/cultivation of aquatic mimosa in order to reduce evaporation of water from ponds and open water bodies; and

8.2.2.14 Ensuring environmental preservation and soil health through the application of fertilizers deep into the soil.

### 8.3. Adverse Weather, Pest warning and preparation:

8.3.1 Taking initiatives to modernize and strengthen the adverse weather forecasting system at the local level;

8.3.2 NARS affiliated institutions to observe outbreak/increase of diseases and insects throughout the year and propagate advance actions and cautionary forecasts; and

8.3.3 Encouraging everyone to take all necessary initiatives to take advance measures to minimize damages caused by climate change and to prepare and pursue appropriate crop calendar, distribute seed/saplings with a view to tackle the post-disaster situation;

### 8.4 Agroforestry:

8.4.1 Taking steps in the research and extension of economic benefit and risk estimation of different elements of agroforestry;

- 8.4.2 Taking measures to ensure active participation of the local people, especially the women, in local agroforestry and increasing awareness;
- 8.4.3 Innovating measures to make agroforestry management profitable by way of using primarily the traditional crops, forest resources and animal husbandry;
- 8.4.4 Undertaking measures to popularize agricultural/social forestry by cultivating appropriate vegetables/fruits/spices on roadsides and on banks and ridges;
- 8.4.5 Encouraging agroforestry to reduce damages caused by natural disasters and to plant affordable and eco-friendly trees as a rule for agroforestry; and
- 8.4.6 Adopting integrated activities of the department of agricultural extension with the forest department, Bangladesh Forest Research Institute and universities in agroforestry.

## 9. Special Regional Agriculture

The north-western part of the country is drought-prone, the northern region is prone to cold and the hilly areas of the southeast are prone to crop failures. Salinity inflows in soil and water, high tides and flooding, tidal waves and cyclones are the main barriers in crop production in the coastal south and south western region. On the other hand, construction of coastal water regulator dams (POLDARs) in the seventies and eighties has lent a different dimension to the geographical landscape in the southern region. The following steps will be taken to transfer value sustainable technological innovations and adaptive measures on a priority basis in the country's crisis-ridden regions:

### 9.1 Coastal agriculture:

Following steps will be taken for extension of the techniques of increasing productivity through management of salinity in soil and water and introduction of salt-tolerant crops, apart from adopting agricultural technology:

- 9.1.1 To bring uncultivated lands under cultivation to increase the productivity of region-specific potential crops and cropping pattern to increase the income of farmers;
- 9.1.2 Increasing cultivation and intensification of crops suitable for coastal region (Mug, Corns, Watermelon, Sweet Potato, Cotton, Sorghum, Wheat, ground nuts,

Sunflower, creepers, Cauliflower, Cabbage, Carrot, Cucumber like vegetables, Gourd, Sweet pumpkin, Pumpkin etc.);

9.1.3 In cooperation and coordination of government agencies and beneficiaries with the view to protect crops, preserving irrigation water by re-excavating canals /ditches, repairing embankments/seasonal dams, overhauling water control infrastructure and planting trees;

9.1.4 Focusing on research activities for inventing paddy varieties, seedlings of which are longer than 50 cm or more, suitable for high tide areas;

9.1.5 Expansion of cultivation of vegetables and fruits on the embankments of fisheries, and fish cultivation in paddy fields to increase productivity and income;

9.1.6 Cultivating vegetables throughout the year and planting fruit-producing trees (Coconut, Betel nuts, Mango, Guava, Mango Steen, Sour Wood Apple, Hog Plum, corn meal, Malta etc.) on homestead lands;

9.1.7 Establishment of market facilities by formation of agricultural cooperatives for the purpose of marketing agricultural products;

9.1.8 Adopting special programme for motivating to increase cultivation of profitable crops (Aus paddy/corn);

9.1.9 Reducing the damage caused by storms and tidal water by planting palm leaves and increasing farmers' income by collecting the juice out of the same; and

9.1.10 Providing caution and awareness through supplying information regarding agricultural weather through monitoring of salinity of soil and water and the nature of tidal waves.

## 9.2 Marshy and Water Land Agriculture:

In the lowlands of Haors, the cultivated Boro paddy often get submerged in early/ sudden floods in semi-ripe condition. Moreover, the timely supply of agricultural inputs and extension services in these areas is hampered due to lack of proper communication system. In order to survive in such adverse situation, the following special agricultural initiatives will be taken and implemented:

9.2.1 Introducing the floating method technique of production of paddy seedlings, increased cultivation of early varieties, and reducing crop damage by continuously discouraging Nabi variety cultivation;

9.2.2 Adopting small programs based on the suitability along with demand-based technological improvements;

9.2.3 Strengthening modern technology-based training system for the expansion of area-specific suitable agricultural system;

9.2.4 Strengthening expansion programs aimed at popularizing crop varieties tolerant to flood and waterlogging;

9.2.5 To protect crops from flash floods, construction of dams and forecasting disasters caused by flood in advance; and

9.2.6 Taking measures to increase farmers' income by promoting floating cultivation of grass and vegetables.

### 9.3 Agriculture in Mountains:

In the hilly regions, where the traditional agricultural system had been jhum cultivation, with the touch of modern agriculture, presently mango, litchi, pineapple, lemons of advanced quality and Bangla bananas and jackfruit of local varieties are being widely cultivated. The areas of the agricultural blocks in hilly areas are very large, communication system remote and habitations of the local communities scattered. Thus, for rapid extension services in hilly areas, the following special methods/programs will be followed to save labour and time:

9.3.1 Strengthening programmes of improving modern varieties and technology, suitable for eco-friendly jhum cultivation;

9.3.2 Reducing the area under block and increasing the number of extension staff to make the extension services rapid and easier;

9.3.3 Connecting the headman/dealer with the representatives of the people in blocks/wards to make extension services user-friendly;

9.3.4 Provide training to the fruit/vegetable farmers and interested nursery owners for preparing saplings/grafting in advanced methods by increasing knowledge and skill with the view to employment generation and increasing income;

9.3.5 Arranging water for the use of agricultural and household work through conservation and development of water and flowing water of hilly springs/falls;

9.3.6 Encouraging irrigation activities through drip/sprinkler irrigation and using/introducing other modern and suitable technologies;

9.3.7 Facilitating connections with markets and establishing storage facilities to ensure fair prices of agricultural commodities, including fruits popular in the hills and Binni variety of paddy;

9.3.8 Encouraging the cultivation of suitable crops on the slopes of hilly terrain to prevent landslides; and

9.3.9 Creating of fruit gardens/forest areas in fallow lands to protect natural resources, generate employment and increase income.

#### 9.4 Barind agriculture

The agricultural system of Barind region is dependent on rain, its soil relatively infertile with low water holding capacity. Due to these reasons, the paddy in its seedling or semi-ripe conditions is often affected by drought, reducing the yield drastically and the subsequent rabi crop becomes uncertain. The following steps will be taken to increase agricultural production in the area:

9.4.1 Encouraging farmers to tackle damage caused by drought through development and extension of deep-rooted, drought-tolerant and less water consuming crops;

9.4.2 To increase the soil's water retaining capacity and fertility, inspiring increased use of lime in highly acidic soil, organic fertilizers and introducing crop cultivation related to green fertilizer;

9.4.3 Encourage the use of rainwater preservation in mini ponds or creeks in the high Barind tracts to be use for irrigation purposes;

9.4.4 Encouraging the cultivation of mixed crop of corn and thorn-less mimosa to improve soil fertility and weed control; and

9.4.5 Discouraging establishment of deep tube wells and encouraging cultivation of rabi crops instead of Boro paddy as far as possible in areas with water crisis.



## 9.5 Agriculture in Char lands:

9.5.1 Conducting surveys in matters of the spread of char areas, soil fertility, possible areas for agricultural production etc.;

9.5.2 Providing development and extension services by Riverbed crop farming system through sandbar farming on unstable sand beds arising on riverbeds in dry seasons;

9.5.3 Encourage the application and determination of the amounts of balanced fertilizers in accordance with the existing crop pattern in the sand bed areas;

9.5.4 Encouraging farmers to cultivate crops, suitable for relatively infertile/sandy soil;

9.5.5 Inspiring the farmers to use organic/green fertilizers to increase productivity and cultivate crops with nitrogen content; and

9.5.6 Providing special agricultural aid for crop production in Char areas and facilitating market connections.

## 9.6 Natural Disaster and Agricultural rehabilitation:

### 9.6.1 Flood:

9.6.1.1 Undertaking programmes of development, cultivation and extension of short-term/Nabi (late crop) varieties, and inspiring farmers to apply suitable post-harvest technology to deal with the damages caused by sudden/advance or late floods;

9.6.1.2 Undertaking measures to ensure necessary extension services for timely application of fertilizers for satisfactory production of crops planted in Nabi (late crop) areas;

9.6.1.3 Taking steps for initiating cultivation of mixed and relay crops in possible areas or rapid rabi crop cultivations; and

9.6.1.4 Reducing crop damages by forecasting floods and providing support to cultivation afterwards and ensuring sustainable production system.

### 9.6.2 Extreme temperature:

9.6.2.1 Strengthening the initiative to improve varieties of Boro paddy to make it cold tolerant at sapling, tiller and panicle initiation state;

9.6.2.2 Strengthening the extension activities and improvement in the breed of wheat and autumnal paddy to make it tolerant to rising temperatures; and

9.6.2.3 Undertaking activities to develop suitable production technology for extremely hot and cold weathers.

#### 9.7 Cyclone and tides:

9.7.1 Undertaking initiatives to reduce crop damages during sowing/planting by changing time and suitable technology extension; and

9.7.2 Providing loans, training and incentives to farmers for compensating post-disaster losses.

#### 9.8 Drought:

9.8.1 Encouraging supplementary irrigation activities by conserving rainwater through digging of ponds, ditches and canals;

9.8.2 Taking steps through training to extend appropriate technology, suitable for dealing drought;

9.8.3 Increasing the income of farmers by expanding cultivation of high value crops; and

9.8.4 Identification of drought tolerant crops and encouraging the farmers in producing the same.

#### 9.9 Thunderstorm:

9.9.1 In order to save crops and lives, emphasizing activities of planting of palm, betel nuts and other tall lightning resistant trees; and

9.9.2 Undertaking initiatives to alleviate the risk in lightning-prone areas through providing prior caution and promoting agroforestry.

#### 9.10 Submergence and salinization:

9.10.1 Encouraging farmers to identify waterlogging and salinity tolerant crops and in the use of appropriate agricultural management along with cultivation in floating methods;

9.10.2 Encouraging the famers to foster ducks/fish along with crops to increase their aggregate income; and

9.10.3 Increasing the farmers' capability through providing training on matters related to waterlogging adaptive technology.

## 10. Specialized agriculture

It has been possible to grow vegetables and fruits in soilless method because of lack of agricultural land, natural disasters, the urge to earn livelihood, hobby and need for nutrition and various other reasons. The southern region's floating agriculture has already been nationally and internationally acknowledged as the Globally Important Agricultural Heritage System, which can be marketed by branding as organic agricultural products. In this regard, it is necessary to take the following steps to ensure sustainable production techniques with appropriate varieties:

### 10.1 Rooftop cultivation:

10.1.1 Providing necessary training/encouragement to increase the importance and awareness of rooftop cultivation;

10.1.2 Integration the government and private sectors in emphasizing suitable varieties for rooftop cultivation, technological innovation and extension services; and

10.1.3 Inclusion of rooftop cultivation in the main agricultural programmes and providing assistance in commercial production.

### 10.2 Hydroponic and Aeroponic agriculture:

10.2.1 Adopting special measures for extending growth of nutrition/productivity in fruit and vegetable cultivations through hydroponic culture technology;

10.2.2 Providing assistance in production, training and motivation with the aim to encourage hydroponic agricultural production and increase its skill; and

10.2.3 Encouraging sustainable extension of aeroponic agricultural technology by examining viability of the same.

### 10.3 Mushroom and other high-value crop cultivation:

10.3.1 Especially encouraging the activities of identifying and selecting appropriate varieties of profitable and potential mushroom and other high value crops;

10.3.2 Adopting necessary development activities for innovating and extending sustainable technology in the cultivation of mushrooms, asparagus, small corns and other high value crops;

10.3.3 Taking initiative to create entrepreneurs, especially from women, to produce and supply spawn of mushrooms; and

10.3.4 Commercially inspiring the private sector through providing training/production assistance.

#### 10.4 Protective Agriculture:

10.4.1 Identifying crop and area-based controlled agricultural activities, emphasizing and encouraging controlled agriculture according to demands of local and international markets and increasing skills along with institutional capability;

10.4.2 Encouraging the production and import of necessary greenhouse, glass house and growth chambers for the purpose of controlled agricultural development and to take necessary steps to discount tariffs and prevent pollution; and

10.4.3 Especially encouraging sapling and crop production under controlled agricultural management to minimise risks. For this, providing necessary assistance in production and import of materials to be used.

#### 10.5 Protective agriculture:

10.5.1 Emphasizing development activities of machineries needed for protective (cost, fuel and labour saving) agriculture and increasing skills along with institutional capability;

10.5.2 Strengthening developmental programs through identifying profitable crops and agricultural activities; and

10.5.3 Undertaking special initiatives for development and extension of protective agricultural through training/awareness generation.

#### 10.6 Potentials of marine areas:

10.6.1 Undertaking research activities to Identify floating plankton living particles, appropriate for use in food and medicinal industries for human, domesticated animals and aquatic animals and for its safe and controlled production and use;

10.6.2 Selecting areas suitable for algae cultivation, developing its varieties, innovating techniques of cultivation/collection and adopting programs to increase production;

10.6.3 Increasing the capability of all institutions to strengthen the research in algae cultivation; and

10.6.4 Strengthening connection between local and import market and expanding algae cultivation by motivating private/individual entrepreneurs.

10.7 Floating Agriculture:

10.7.1 Examining potentiality of crops suitable for floating agriculture, strengthening modernization of its production system and adopting branding initiatives in marketing the same as traditional products;

10.7.2 Adopting short, mid and long-term programmes by involving the enterprising stakeholders with the aim of expanding area-based demands and useful adaptable technology; and

10.7.3 Taking initiatives to integrate floating agriculture with mainstream agricultural activities in overall and integrated disaster risk management;

10.8 Sorjan Agricultural Method:

10.8.1 Adopting programs to increase production of vegetables, paddy and fish in an integrated way following the Sorjan method in waterlogged and high tide areas;

10.8.2 Evaluation of traditional Sorjan method and emphasize of activities on increasing its productivity; and

10.8.3 Taking initiatives to provide training to private and individual entrepreneurs regarding importance of this technology, technique and production technology.

10.9 Precision agriculture:

10.9.1 Creation of manpower with the aim is to supply ingredients to increase time and area-specific soil fertility and moisture, encouraging innovation and import of machineries and taking steps to discount tariffs to the extent possible; and

10.9.2 Taking initiatives to select appropriate crops for precision agriculture and improving production technology.

## 11. Food security and production of agricultural goods

It is possible to ensure safe food production by properly following the rules of Good Agricultural Practices (GAP). The following steps will be taken for safe food production to assure public health:

### 11.1 Increasing capability:

11.1.1 Standardization and formation of GAP authorities to introduce better agricultural practices;

11.1.2 Adopting measures to examine food products for assuring safe level of pesticides in crops and preventing infections caused by germs; and

11.1.3 Taking steps for extension, marketing, motivating and creating skilled manpower for generating awareness and safe and nutrition rich food production.

### 11.2 Development, Awareness and training:

11.2.1 Taking initiative for GAP branding of various crops and establishing GAP regions;

11.2.2 Strengthening monitoring activities in the sales, use and control of adulterated and low-quality pesticides;

11.2.3 Innovating easy and affordable methods to estimate the levels of chemicals and pesticide residues applied to fruits and vegetable;

11.2.4 Taking initiatives to introduce/implement best agricultural practices and certification of the same;

11.2.5 Taking initiatives in creating awareness about detoxification of pesticide-treated crops/vegetables/fruits;

11.2.6 Ensuring safe food production through providing training to stakeholders in new pest management and development of safe pesticides;

11.2.7 Undertaking initiatives to collect agricultural goods, post-harvest management, handling, preservation and processing of agricultural goods healthily according to the Safe Food Act-2013; and

11.2.8 Discouraging marketing and production of crops having health risk concerns.

## 12. Agricultural Marketing

An effective and efficient marketing system plays an important role in making the produced goods readily available to the consumers and for overall economic development. The role of agriculture marketing is immense in increasing production, maintaining product quality and ensuring fair price. The following steps will be taken to create opportunities for the farmers to avail fair prices of produced goods along with increasing their bargaining power for ensuring profitable agriculture sector:

### 12.1 Development of Agricultural Marketing infrastructure:

#### 12.1.1 Agricultural industries and imports:

12.1.1.1 Creating sustainable supply chain through development in market infrastructure and agricultural goods marketing system;

12.1.1.2 Encouraging both the government and the private sectors to develop agricultural goods' hats (rural weekly markets) and markets;

12.1.1.3 Emphasizing value addition and value chain of agricultural goods with the aim of improved market management;

12.1.1.4 Encouraging establishment of modern storage facilities and packaging houses with other facilities at the government and private levels to make agricultural goods easily available, increasing their freshness/conservation period and keeping it safe;

12.1.1.5 Encouraging initiatives of digitalization of agricultural goods' hats and markets;

12.1.1.6 Encouraging partnership of both public and private sectors in investments and imports in establishing laboratories and testing centres with all the necessary facilities for testing the qualities of agricultural goods and for their standardization; and

12.1.1.7 Taking measures for use of modern technology in transportation and marketing to reduce post-harvest losses.

#### 12.1.2 Market information collection and promotional services:

12.1.2.1 Collection and dissemination of up-to-date information on wholesale and retail markets of agricultural products and agricultural implements to the producers, traders, entrepreneurs and consumers;

12.1.2.2 Encouraging and extending necessary of value-addition services of agro-products for the farmers and entrepreneurs;

12.1.2.3 Increasing propagation of packaging /grading /labelling to popularize these programs; and

12.1.2.4 Taking initiative to propagate probable prices of agricultural commodities in advance basing on the demands and supply of agricultural goods.

## 12.2 Processing of Agricultural goods and expansion of industries:

12.2.1 Encouraging establishment of primary agricultural product-based industries;

12.2.2 Taking steps to increase the income of the farmers by encouraging them to establish industries by using agricultural by-products, like waste/chaff, hay, jute leaves and jute stems; and

12.2.3 Aiding the traders and entrepreneurs technological and technical support in the processing of agricultural goods.

## 12.3 Commercial agriculture:

12.3.1 Providing special extension services and assistance to contractual production system for the sake of commercial agriculture;

12.3.2 Undertaking initiatives for introduction and promotion of commercial agriculture through profitable agricultural goods production and creating connections between farmers and consumers; and

12.3.3 Encouraging cultivators by giving them incentives with the aim of attracting them to commercial agriculture.

## 12.4 Import-oriented goods production:

12.4.1 Undertaking initiatives to increase production and marketing of export-oriented agricultural products; and

12.4.2 Encouraging production of exportable products through good agricultural practices, organic agriculture and grading.



## 12.5 Market Development:

12.5.1 Exploration and diversification of potential new market areas abroad in areas inhabited by Bangladeshis;

12.5.2 Undertaking initiatives in expanding national and international markets for eco-friendly/organic agricultural products;

12.5.3 Taking steps to increase demand in the international market through strengthening coordination between the government and non-government organizations;

12.5.4 Assisting the development/use of e-infrastructure for export market development, communication, data collection and dissemination;

12.5.5 Encouraging participation and coordination of government and private sectors for effective administration of markets;

12.5.6 Provide technological assistance to individual entrepreneurs and farmers in undertaking agricultural trading activities;

12.5.7 Adopting programmes to increase opportunities of agricultural trading in national and international markets through providing incentives;

12.5.8 Adopting programme for crop storage loans to ensure fair prices of agricultural products; and

12.5.9 Providing assistances for establishing connections between local and export markets for handicraft industries using agricultural by-products.

## 13. Women empowerment

The direct and indirect participation and labour of women in the agricultural sector is well-acknowledged. The main goal of women's development in agriculture is to create skilled women human resources. To discourage rampant migration to cities, the following steps will be taken for the development of women's participation and role in agriculture after appropriate evaluation of the same:

13.1 Providing technical support on a priority basis and taking steps to increase the capability of women through providing them training in activities like family nutrition security, crop production, post-harvest works, agricultural business and industries;

13.2 Acknowledging the contribution of women in agriculture, especially in the field of homestead vegetable production, drying and storing of different crops, and encouraging use of women labour on cash value in all possible sectors;

13.3 Adopting different set of extension activities for women farmers in the light of Agricultural Extension Policy for crop production activities;

13.4 Ensuring the participation of women in the process of planning, decision making, supervision and distribution in the process of achieving food security;

13.5 Evaluating and acknowledging women's labour, role and contributions to guarantee their social status and security;

13.6 Taking initiatives to eliminate the inequality in wages of women workers in agriculture and ensuring equal wages for both men and women;

13.7 Taking initiatives to further consolidate the position of women in economic activities through providing encouragement/motivation in establishing and managing agro-product-based cottage industries; and

13.8 Encouraging women in agricultural education, research, extension and training.

## 14. Youth power in Agriculture

An educated, aware, knowledgeable, patriotic and energetic youth power will drive agriculture in the future. Through encouraging the formation of youth farmers' clubs, setting up of small and medium agri-business establishments, building up of their self-confidence and capability, it is necessary to ensure the participation of the youth in all development activities. Since there is an opportunity and possibility to involve them in agricultural growth, the following programs will be adopted in agriculture based economic activities:

14.1 Promoting active participation of youth in agriculture through the establishment of 'Youth Farmers' Club';

14.2 Creating opportunities for increasing self-employment of the youth by encouraging the production of high yielding and high value crops and establishment of small and medium agro-industries;

14.3 Encouraging the young farmers in agriculture by encouraging investment, loan facilities on easy terms and providing motivation;

14.4 Making the youth successful agricultural/agro-industrial entrepreneurs through enhancement of training, awareness and skill;

14.5 Taking initiatives to attract educated youth through reduction of physical labour by agricultural mechanization;

14.6 Creating opportunities for self-employment for the youth through application of value addition techniques/methods to the produced crops; and

14.7 Taking initiatives to engage the youth in trading of agricultural commodities, establishing processing industries, fish farming, animal husbandry etc. activities subsidiary to agriculture.

## 15. Investment in Agriculture

The demand-based investment on infrastructure development, research and development, extension, planning and implementation of development projects, arrangements of modern agricultural implements, creation of efficient manpower, developmental assistance, agricultural rehabilitation etc. will make agriculture a rapidly progressing sector. In addition to the allotted funds for research, Agricultural Research Endowment Fund has been created with the participation of government and private institutions and universities for agricultural research and development. The following initiatives will be taken with the aim of direct investments for developing human resources, alleviating poverty and improving the standard of living in the countryside:

### 15.1 Research Infrastructure and Human Resource Development:

15.1.1 Allotting necessary funds for technological development through research by increasing institutional capability along with modern facilities, knowledge and skill;

15.1.2 Allocating funds for development of irrigation, drainage, marketing and market infrastructure and farm mechanization;

15.1.3 Taking initiatives to invest more in the field of higher and specialized education specially to create skilled human resources;

15.1.4 Allocating funds for conducting training to achieve skills in matters of genetic resources at national/international level;

15.1.5 Increasing investment in development of shock-tolerant/resistant and nutrient enriched varieties/technological innovation through conducting wide-spread researches on matters related to biotechnology;

15.1.6 Taking initiatives to establish agro-climatic and meteorological forecasting centres and undertaking ventures for its development;

15.1.7 Undertaking initiatives to turn the unemployed educated youth into an entrepreneur through training/loan assistance;

15.1.8 Initiating investments in establishing farms/horticultural centres to exhibit agricultural technology at the Upazila level;

15.1.9 Taking initiatives to enhance capability of seed certification agencies along with government organizations to meet the rapidly increasing demand of seeds;

15.1.10 Establishing infrastructure for production, cold storing and food processing of agro-products and Encouraging the private investments in export of flowers/fruits/vegetables.

## 15.2 Agricultural industries and employment:

15.2.1 Taking steps to provide assistance to the farmer groups in seed/agro-products processing, establishing agricultural industries and buy transportable cooling van;

15.2.2 Providing motivation to take up activities like farm mechanization, cultivation of profitable crops, beekeeping, preparing organic fertilizers/vermicompost etc.; and

15.2.3 Taking initiatives to set up agricultural tourism sector for the purpose of attracting national and international tourists and generating income.

## 15.3 Incentive, agricultural rehabilitation and market development:

15.3.1 Taking measures to provide financial assistance or loans for increasing crop productivity, post-harvest technology, sustainable management and development of natural resources;

15.3.2 Undertaking special measures in providing loans, assistance in production and prices to the marginal farmers, sharecroppers and poor farmers;

15.3.3 Arranging allocation of funds to support production for agricultural rehabilitation of the small and marginal farmers;

15.3.4 Undertaking initiatives to provide funds for promoting market connections to assure fair market price for agricultural commodities;

15.3.5 Strengthening agricultural rehabilitation programs to compensate the farmers' crop losses in natural disasters;

15.3.6 Encouraging private spending for increasing agro-production, marketing and supply of better implements;

15.3.7 Undertaking initiatives to support the production of healthy, safe, export-oriented products and development of export markets;

15.3.8 Encouraging private investments in foreign agriculture trade, without compromising national interest; and

15.3.9 Taking initiatives of time bound planned investments at national, regional and district levels by identifying the priority sectors in agricultural development.

## 16. Agricultural cooperatives

Co-operatives play an important role in creation of employment opportunities, poverty alleviation and socio-economic development. Opportunities are there to start cooperatives in the crop subsectors, like fish, milk, housing, small loans and service sector. In the country many project-based Common Interest Groups, Water Management Groups and other cooperatives are engaged in various income generation activities. With the help of training and loan assistance, these types of cooperatives will be able to enrich the agricultural sector. The following steps will be taken to introduce and expand such agricultural co-operatives:

16.1 Encouraging and cooperating with the self-motivated cooperatives or group-based agricultural production coordinating the marginal farmers, small producers and entrepreneurs, keeping land ownership intact;

16.2 Providing expansion services and cooperative-based production, use of agricultural machineries, special programme to procure agricultural implements, loans and development assistance;

16.3 Prioritize the cooperative-based initiatives in profitable crop production and mechanization of irrigation and farms;

16.4 Encouraging and supporting cooperative-based marketing to assure fair prices of agricultural commodities;

16.5 Assisting the functioning water management cooperative samitis by promoting their participation in managing, running and maintaining of projects, providing training, enhancing income, availing extension services, arranging inputs and getting loans;

16.6 Taking initiatives to increase women's participation in production, preservation and marketing of cooperative-based agricultural products; and

16.7 Not to keep any land fallow or uncultivated, provide motivation to bring cultivable lands of non-resident and absent landowners under cultivation by cooperative method to increase the agricultural production and marketing and protecting everyone's interests through dividing the earned profit between the landowners, agricultural labourers and cooperatives in a reasonable way.

## 17. Information and Communication Technology

Use of information and communication technology for rapid and wide extension of newly invented technology will enrich agriculture. Being accessible to all, effective and timesaving, the newly invented technologies are helpful in outreaching extension services to backward and remote areas. In future, to ensure smart farmers and digital agriculture, the following steps will be taken to use traditional and modern communication methods in extension services:

17.1 Undertaking endeavours to establish necessary numbers of agricultural information services and community radios in risky zones with the aim to increase crop production;

17.2 Using Bangabandhu Satellite-1, JIS and Remote Sensing technology in the collection of information on crops and environment;

17.3 Encouraging telecasting of agriculture-related programs on TV channel every day at a specific time for the benefit of the community;

17.4 Taking measures to develop the standard of agricultural services thorough encouraging contacts with the agricultural call centres;

17.5 Transforming Union Digital Centre (UDC) as agricultural information and communication centre and developing online e-agriculture or agriculture services for easy access to agriculture and agriculture-based services;

17.6 Taking steps to promote digital way of propagating programmes on matters like crop varieties, production technology, nutrition security, adverse climate, pest management, crop protection and processing;

17.7 Strengthening the digital services like internet, online, offline, mobile apps, web portal, Facebook page, etc. and encouraging the farmers to use the same;

17.8 Adoption measures to publicize agro-based daily/weekly magazines (including online);

17.9 Taking initiative to prepare database of all farmers and provide Digital ID cards to all the farmers; and

17.10 Taking initiatives to develop manpower and skills of all institution's related to agriculture for providing information technology services.

## 18. Labour in the Agricultural Sector

The use of capital-intensive technology in production processes including agricultural mechanization is on the rise. As a result, use of labour power has been gradually declining in agricultural and is being transferred to the field of industry and service sectors. It is imperative to take steps to acknowledge the existing labour force, increase its dignity and development in order to retain the same in agricultural sector. It is necessary to develop the skill and knowledge of the labourers in this sector through training for efficient use of agricultural technology. The following steps will be taken to make people interested in investing labour agricultural sector:

### 18.1 Motivation:

18.1.1 Taking steps to appreciate and dignify agricultural labour;

18.1.2 Adopting programmes to generate round the year employment for agricultural labourers through crop intensification and diversification;

18.1.3 Encouraging the agricultural workers to set up local clubs and availing services as a group; and

18.1.4 Adopting steps to encourage farmers in enhancing production through education trips/tours at local/regional/international levels with the aim to acquire experience in agriculture.

### 18.2 Labour Welfare:

18.2.1 Risk reduction in hazardous agricultural tasks (such as: application of pesticides and using heavy, sharp and revolving agricultural machines);

18.2.2 Encouraging the adoption of awareness in risky agricultural practices;

18.2.3 Undertaking initiatives to include welfare of agricultural labourers in the development programs; and

18.2.4 Adopting programs like forming clubs, formulating policies of club administration, creating welfare fund and loan distribution through raising funds for poor and underprivileged farmers.

## 19. Coordination and Cooperation

The main objective of the present government is to promote sustainable agricultural development through coordination of government, private, international and individual initiatives and integrating them with agricultural production to confront the multifaceted challenges in crop production. It is possible to minimize calamities in emergency situations through ensuring adequate technological, technical and economic cooperation in pre-preparation and rehabilitation programmes. In these areas, the following steps will be taken in cooperation with the national, international and donor organizations:

### 19.1 At the Strategic Level:

19.1.1 Taking steps to implement agricultural production and rehabilitation programmes by coordinating all public and private organizations, including ministries controlling agricultural implements/departments;

19.1.2 Adopting an integrated plan for development of drainage and irrigation systems for proper use of water resources and resolution of the waterlogging problem with the aim to increase agricultural production;

19.1.2 Taking steps to form National Committee, if required, in times of disaster to bring the agricultural situation under control.

### 19.2 At the Implementation level:

19.2.1 Undertaking collective initiatives in all activities, including existing problems in agriculture and sustainable production, by all the government organizations involved in the management of agricultural research, extension, marketing and production;

19.2.2 Establishing effective and intense communication among NARS-affiliated institutions, agricultural extension department and interested non-governmental/donor organizations to identify and resolve the problems at the field level; and



19.2.3 Working in unison of all government organizations in providing demand-based market services to ensure fair prices of agricultural commodities.

19.3 Government and private collaboration:

19.3.1 Encouraging government agencies to jointly undertake research, extension, supplying materials, marketing, improving product qualities with interested private organizations; And

19.3.2 Expediting the crop variety/technological extension services through organizing training and meetings for opinion exchange.

19.4 Regional and international collaboration:

19.4.1 Encouraging intensification of activities of the NARS-affiliated institutions with international agricultural research centres;

19.4.2 Integrating implementation and monitoring activities of international collaborative research by BARC;

19.4.3 Adopting measures to increase cooperation at the regional level by the government for innovation of crop varieties and technology;

19.4.4 Strengthening participation of national institutions in international research and emphasizing the inclusion of locally prioritized issues in international collaborative research;

19.4.5 Taking initiatives to exchange technological innovation /extension and experience at the international/regional levels; and

19.4.6 Encouraging adoption of initiatives by developed/developing countries and international/regional organizations for collection of species/varieties of plants, exchange of genetic resources and development of modern knowledge and skills.

19.5 Partnership:

19.5.1 Encouraging the establishment of strategic partnerships with the human resource development institutions of developed and developing countries in enriching the knowledgebase in agricultural sector and use of technology; and

19.5.2 Establishing strong connections with the national and international institutions through exchange of views.

## 20. Various Topics

All those involved in the development of productive agricultural development should be encouraged and rewarded. It is also necessary to highlight the creation of self-employment as well as other aspects of profitable farm development. As natural resources with local knowledge and characteristics have market value and economic importance, it is necessary to emphasize on production and marketing of the same to increase income. It is also important to introduce institutional mechanism to encourage timebound development of all associated in the development of innovation capability. Considering all the factors, the following steps will be taken to keep a dynamic agricultural system moving:

### 20.1 Intellectual Property Rights:

20.1.1 Encouraging and assisting institutions/individuals in achieving intellectual property rights at national and international level in the innovation of technology and knowledge; and

20.1.2 Adopting preservation of Intellectual Property Rights by paying royalty and incentives for invented technology.

### 20.2 Geographical Indication (GI):

20.2.1 Adopting specific programme in the protection of identification, selection, registration or preservation of processing of geographical indication crops;

20.2.2 Taking initiatives to provide training in matters related to sustainable production of and increasing awareness about GI crops; and

20.2.3 Encouraging all concerned to germination, selling and marketing GI crops in national/international markets and exporting the same.

### 20.3 Non-farm activities:

20.3.1 Adopting programs for employment generation by using agricultural goods and by-products;

20.3.2 Taking measures to bring the rural population under regular training with the aim to create employment in the non-agricultural sector; and

20.3.3 Encouraging the adoption of more initiatives by development partner organizations to involve the rural population in employment in non-farm sectors.

## 21. Dominance of Bengali language

After the implementation of 'National Agriculture Policy 2018', the government may publish a reliable text in English of the same by Government Gazette Notification. In case of any confusion/inconsistency arising among the Bengali and the translated English text, the Policy formulated in Bengali will prevail.

## 22. Conclusion

The recent agricultural development in Bangladesh is a unique example for the world. Emerging from food crisis to appear as a self-sufficient country in food, presently programs are being undertaken to fulfil the nutrition demand along with food. Because of technology-based cultivation, productivity of crops such as paddy, vegetables, fruits, potatoes, jute etc. has increased. On the other hand, to provide food for the increasing population in the context of declining agricultural land and to accelerate national growth, it has been a necessity to frame the agricultural development plans from a new perspective. Especially, increasing the demand for diverse food in the context of growing income of the people in the country, ensuring the market value of the products and adverse impact of climate change has added new dimensions in agriculture planning.

Undertaking necessary steps following the 'National Agriculture Policy 2013' has resulted in implementation of hunger-free Bangladesh, the dream of the father of the nation. Due to the steady growth of the agricultural sector, the national growth of more than of 7% has become possible. The 'National Agriculture Policy 2018' has been formulated as a directive document with inclusion of up-to-date topics, dealing constraints because of climate change and acceleration agricultural growth.

In this policy, emphasis has been given to application of improved technology, region specific crops and management to increase productivity at an expected level to raise farmers' income. Its implementation will enhance capabilities in terms of agricultural growth, safe food, food security, poverty alleviation and confronting global warming created risks, and accelerate the construction of a hunger-free golden Bengal, an ever-cherished dream of the father of nation, Sheikh Mujibur Rahman. With the merits, skills and capabilities of all and balanced use of natural resources, agriculture will have a strong foundation.