



National Agriculture Policy 2018

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

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



বাণী

প্রধানমন্ত্রী
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

১৭ শ্রাবণ ১৪১৩
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কৃষি খাত বাংলাদেশের অর্থনীতির মূল চালিকা শক্তি। খাদ্য ও পুষ্টি সরবরাহ, শিল্পের কাঁচামাল যোগান, কর্মসংস্থান সৃষ্টি ইত্যাদি ভূমিকায় কৃষি খাতের গুরুত্ব অপরিণীম। আর কৃষি নির্ভর বাংলাদেশের অগ্রগতি অনেকটা নির্ভরশীল এ দেশের কৃষক সমাজের সাফল্যের উপর। সর্বকালের সর্বশ্রেষ্ঠ বাঙালি, জাতির পিতা বঙ্গবন্ধু শেখ মুজিবুর রহমান-এর নেতৃত্বে বাঙালির মহান স্বাধীনতা সংগ্রামে এদেশের মোহনতি কৃষক সমাজ গৌরবময় ভূমিকা পালন করেছেন। স্বাধীনতার পর জাতির পিতা কৃষি এবং কৃষকের উন্নয়ন ও কল্যাণে বিভিন্ন কর্মসূচি গ্রহণ করেছিলেন।

জাতির পিতার প্রত্যক্ষ নির্দেশনায় বাংলাদেশের সংবিধানে পুষ্টিমান ও জনস্বাস্থ্য উন্নয়নকে রাষ্ট্রের অন্যতম প্রধান কর্তব্য হিসেবে চিহ্নিত করা হয়। এই ধারাবাহিকতায় কৃষি খাতের বৈপ্রকৃিক পরিবর্তন সাধনের লক্ষ্যে নীতিমালা প্রণয়নের উদ্যোগ নেওয়া হয়েছিল। কিন্তু জাতির দুর্ভাগ্য, সে কাজ তিনি শেষ করে যেতে পারেননি। ফলে নীতিমালার অভাবে দীর্ঘকাল কৃষি খাতের ধারাবাহিক উন্নয়ন ব্যাহত হয়। কৃষক সমাজের অধিকার প্রতিষ্ঠা ও কৃষি উন্নয়ন নিশ্চিত করতে যুগেযুগে একটু কৃষি নীতি অপরিহার্য।

বাংলাদেশ আওয়ামী লীগ ১৯৯৬ সালের নির্বাচনী ইশতেহারে সর্বোচ্চ অগ্রাধিকারভুক্ত খাত হিসেবে সুনির্দিষ্টভাবে কৃষি উন্নয়ন কার্যক্রম গ্রহণে দৃঢ় অঙ্গীকার বাণী করে এবং বিনিয়োগ বৃদ্ধি সহ বিভিন্ন কৃষি উন্নয়নমূলক কার্যক্রম বাস্তবায়ন শুরু করে। সরকার গঠনের পর কৃষক ও কৃষির সার্বিককল্যাণে দীর্ঘ-মেয়াদি পরিকল্পনার অংশ হিসেবে 'জাতীয় কৃষি নীতি ১৯৯৯' প্রণয়ন করা হয়। ফলে কৃষিতে সম্ভাব্য দৃশ্যমান হতে শুরু হয় এবং দেশ খাদ্যে স্বয়ংসম্পূর্ণতা অর্জনের দ্বারপ্রান্তে পৌঁছায়।

পরবর্তীকালে সরকারের লক্ষ্য ও উন্নয়ন কৌশল অনুসরণে 'জাতীয় কৃষি নীতি ১৯৯৯' পরিমার্জন ও সংশোধনপূর্বক 'জাতীয় কৃষি নীতি ২০১৩' প্রণয়ন করা হয় এবং এর আলোকে গৃহীত পদক্ষেপ বাস্তবায়নের ফলে বাংলাদেশ খাদ্যে স্বয়ংসম্পূর্ণ দেশ হিসেবে আত্মপ্রকাশ করে।

কৃষি নীতির মূল লক্ষ্য হলো কৃষিতে উষ্ণ উৎসাহ মৌকাবিলায় অধিক উৎপাদনশীল ও ঘাট সৃষ্টিকৃ জাত ও প্রযুক্তি উদ্ভাবন এবং এগুলো প্রসারের মাধ্যমে টেকসই খাদ্য ও পুষ্টি নিরাপত্তা নিশ্চিতকরণসহ কৃষি বাণিজ্যিকীকরণ। এ লক্ষ্যে ৭ম পঞ্চবার্ষিকী পরিকল্পনা, টেকসই উন্নয়ন অর্জিত, বৃহৎকাল ২০৪১ ইত্যাদি অনুসরণে সরকারের লক্ষ্য ও উন্নয়ন কৌশল এবং 'জাতীয় কৃষি নীতি ২০১৩' পর্যালোচনাপূর্বক 'জাতীয় কৃষি নীতি ২০১৮' প্রণয়ন করা হয়েছে।

কৃষির বর্তমান দুর্ভিক্ষ, সঙ্কটবন ও বৈধিক কৃষি প্রযুক্তির উৎকর্ষ বিবেচনায় প্রণীত ও নীতিতে প্রাতিষ্ঠানিক সক্ষমতা বৃদ্ধির বিষয়ে গুরুত্বারোপ করা হয়েছে। সেই সঙ্গে অগ্রসরমান জীব ও ন্যানো প্রযুক্তি এবং উন্নততর কৃষি তথ্যপ্রযুক্তি বিনিময়ের ক্ষেত্রে "বঙ্গবন্ধু স্যাটেলাইট-৩"-এর সফল ব্যবহারের মাধ্যমে টেকসই কৃষি উৎপাদন ব্যবস্থা নিশ্চিত করা সম্ভব হবে।

'জাতীয় কৃষি নীতি ২০১৮' অনুসরণে কৃষি খাতের পরিকল্পিত উন্নয়ন ও বাস্তবিত হবে এবং এটি জাতির পিতার ক্ষুধা ও দারিদ্র্যমুক্ত সোনার বাংলাদেশ গড়ার স্বপ্ন বাস্তবায়ন কৌশল হিসেবে কাজ করবে বলে আমরা দৃঢ় বিশ্বাস।

আমি 'জাতীয় কৃষি নীতি ২০১৮'-এর সফল বাস্তবায়ন প্রত্যাশা করি।

৩য় বাংলা, ৩য় বঙ্গবন্ধু
বাংলাদেশ চিরঞ্জীবী হোক।

শেখ হাসিনা, এম পি



মন্ত্রী
কৃষি মন্ত্রণালয়
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

বাণী

কৃষি বাংলাদেশের অর্থনীতি এবং জীবিক নিৰ্বাহের অন্যতম প্রধান চালিকা শক্তি। কৃষি উন্নয়নের মাধ্যমে গ্রামীণ জনগোষ্ঠীর কৃষিভিত্তিক সামাজিক উন্নয়ন, সুখ্যাতি ও মান নিৰ্বাপক নিশ্চিতকরণ অগ্রাধিকারভুক্ত বিষয়। জলবায়ু পরিবর্তন, বিষায়ন ও জনসংখ্যা বৃদ্ধি এবং জাতীয় আয় বৃদ্ধির জন্য বৈচিত্র্যময় ফসল চাষিদি ও প্রকৃতিক সম্পদের সীমাবদ্ধতার সাথে সংশ্লিষ্ট সর্বাধিক কৃষি উন্নয়নের জন্য অধিকতর সচিব পরিকল্পনা শেষ হাঙ্গিনার সরকার প্রথম করেছে।

জাতির পিতা বঙ্গবন্ধু শেখ মুজিবুর রহমান দেশের অর্থনীতিক উন্নয়নে কৃষিকে অগ্রাধিকারভুক্ত খাত হিসেবে চিহ্নিত করেছিলেন। বঙ্গবন্ধুর আশ্রয়ের উত্তরাধিকারী মাননীয় প্রধানমন্ত্রী, কৃষকদের শেখ হাসিনার পটভূমিক থেকে ও বাস্তবসম্মত দিক নির্দেশনায় আগ্রহাসী শিল্প সরকার একটি সুচিন্তিত, সমন্বিত ও পরিকল্পিত কার্যক্রম বাস্তবায়নের মাধ্যমে ফসল উৎপাদন ব্যবস্থাকে লাভজনক করতে জাতীয় কৃষি নীতি ১৯৯৯ প্রণয়ন করে। পরবর্তীতে জলবায়ু পরিবর্তনসহ অন্যান্য চ্যালেঞ্জ মোকাবিলা করে টেকসই কৃষি এবং খাদ্য ও পুষ্টি নিৰ্বাপক বিদ্যানে 'জাতীয় কৃষি নীতি ২০১৩' প্রণয়ন করা হয়।

কৃষির উৎপাদনশীলতা ও আয় বৃদ্ধি এবং কর্মসংস্থান সৃষ্টির মাধ্যমে বিশাল জনগোষ্ঠীর অর্থ-সামাজিক উন্নয়নে কৃষি খাতের গুরুত্বপূর্ণ ভূমিকা রয়েছে। এখন আমরা আধুনিক বাংলাদেশ গড়ার ওজনকার বাস্তবায়নকে সামনে রেখে উল্লেখ্য চ্যালেঞ্জ মোকাবিলায় লক্ষ্যে 'জাতীয় কৃষি নীতি ২০১৮' প্রণয়ন করা হয়েছে। কৃষি খাতের সমন্বিত ও সমন্বিত, সমস্যাগুলোকে সম্বাধনায় বৃদ্ধির, গবেষণা ও উন্নয়ন, কৃষিতে তথ্য প্রযুক্তির ব্যবহার, কৃষিতে ন্যানো প্রযুক্তির ব্যবহার, কৃষি সম্পদসম্পন্ন, কৃষিতে সমন্বিত, কৃষি বিপন্ন, বিশেষায়িত কৃষি, উন্নয়ন কৃষি, ভাসমান কৃষি, বিশেষ আঞ্চলিক কৃষি, কৃষিতে নারী ও যুব শক্তি, জ্ঞান ও দক্ষতা উন্নয়ন, কৃষি যান্ত্রিকীকরণ ও কৃষিতে দৌর বিদ্যুৎ এর ব্যবহার ইত্যাদি উল্লেখযোগ্য বিষয়সমূহ নতুন শ্রেণীতে এ নীতিতে অন্তর্ভুক্ত করা হয়েছে। পাশাপাশি প্রকৃতিক সম্পদের যথাযথ সংরক্ষণপূর্বক ফসলের উৎপাদনশীলতা ও শস্যের নিবিড়তা বৃদ্ধি, উৎপাদনশীল এবং লাভজনক কৃষি ব্যবস্থা প্রবর্তন সর্বোপরি খোরগোষ কৃষি এখন সামাজিক কৃষিতে বৃদ্ধিরিত হচ্ছে, যা এ নীতিতে প্রতিফলিত হয়েছে। আধুনিক কৃষির বিজ্ঞানভিত্তিক প্রযুক্তি প্রয়োগের মাধ্যমে সমন্বিত কৃষি সেবা কৃষকের নোরগোষায় পৌছে দেওয়াই 'জাতীয় কৃষি নীতি ২০১৮' প্রণয়নের প্রধান উদ্দেশ্য।

'জাতীয় কৃষি নীতি ২০১৮' প্রণয়নে সংশ্লিষ্ট মন্ত্রণালয়/বিভাগ, বঙ্গর, সংস্থ, সর্বস্তরের কৃষক, জনসংগঠন, জনপ্রতিনিধি, কৃষি বিজ্ঞানী, সম্পদসম্পন্ন কর্মী, বিভিন্ন পেশাজীবী সংগঠন এবং এনজিও প্রতিনিধিদের মতামত গ্রহণ করা হয়েছে।

সংশ্লিষ্ট সকলের এংগেজমেন্টের মাধ্যমে 'জাতীয় কৃষি নীতি ২০১৮' প্রণয়ন ও প্রকাশ করতে পারে কৃষি মন্ত্রণালয় উদ্বিগ্ন। প্রণয়ন কৃষি নীতির সফল বাস্তবায়নের মাধ্যমে কৃষি উন্নয়ন ত্বরান্বিত এবং অধিকতর টেকসই করা সম্ভব হবে বলে বিশ্বাস করা।

০১১ বাংলা, কয় বঙ্গবন্ধু।
বাংলাদেশ তিরতীবী হোক।

মতিয়া চৌধুরী
মতিয়া চৌধুরী, এম.পি



সিনিয়র সচিব
কৃষি মন্ত্রণালয়
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

পটভূমি

কৃষিতে বাংলাদেশের সাফল্য আত্ম স্বীকৃত ও প্রশংসিত। কৃষি প্রধান বাংলাদেশ সমতন কৃষির গতি পেহিয়ে জীবনমান নির্ভর কৃষি থেকে বাণিজ্যিক কৃষির দিকে খাবন্দান। কৃষির সাফল্য গাথার পাশাপাশি মানাবিধ প্রতিকূলতাও রয়েছে। এ সকল প্রতিকূলতা কাটিয়ে কৃষি শেখায় নিয়োজিত জনগণের জীবনমান উন্নয়নে কৃষি ঝাঙের আধুনিকায়ন অর্থনীকার্য যার সাথে সম্পৃক্ত রয়েছে সুষ্ঠু নীতি প্রনয়ন ও অনুসরণ।

বাংলাদেশের শ্রুশক্তি জাতিয় পিতা বঙ্গবন্ধু শেখ মুজিবুর রহমান কৃষির গুবুধ উপলব্ধি করে কৃষি উন্নয়নে যুগান্তকারী পদাঙ্কণ গৃহণ করেছিলেন যার মধ্যে সবুজ বিপ্লবের ঘোষণা অন্যতম। জাতির পিতার দূরদর্শী এ সিদ্ধান্তে বিজ্ঞানভিত্তিক চাষাবাদ ধোশল প্রবর্তনের মাধ্যমে টেকসই কৃষির যাত্রা সূচিত হয়। কৃষি গবেষণা প্রতিষ্ঠানসমূহ পুনরুজ্জীবিত করার মধ্য দিয়ে কৃষি গবেষণায় মুক্তবুদ্ধি চর্চার অবতারণা হয়। পাশাপাশি কৃষি উপকরণ অর্থৎ ইঁজ, সার, সেচ প্রণ্ডি সুলভে প্রাপ্তি নিশ্চিত করে উৎপাদন বৃদ্ধিতে সহায়তা করার উদ্যোগ গৃহীত হয়। এসব কিছুই ছিল জাতির পিতার স্বপ্নের কৃষি নীতির প্রতিফলন।

নদী বিঘোত পাললিক ভূমি সমৃদ্ধ, সুজলা-সুফল, শস্য-শ্যামলা বাংলাদেশ সমতল ব-ইপ হিসেবে পরিচিত। ক্রমবর্ধমান জনসংখ্যা ও ক্রমহাসমান আবাদি জমি, এ দুয়ের পরস্পরিক সংঘাত কৃষিকে চ্যালেঞ্জের মুখোমুখি করে তুলেছে। একই সাথে মুক্ত হরত্রে বৈশ্বিক উচ্চায়নের ফলে মানাবিধ প্রাকৃতিক বিবুপতা। এগুলো ঝেঁকাঝিলা করে দেশের আপামর জনসাধারণের ঝান্না ও পুষ্টি নিরাপত্তা কৃষির ওপরই নির্ভরশীল। মাননীয় প্রধানমন্ত্রী শেখ হাসিনার নির্দেশনা ও মাননীয় কৃষিমন্ত্রী মতিয়া চৌধুরীর নেতৃত্বে বাংলাদেশে সর্বপ্রথম 'জাতীয় কৃষি নীতি ১৯৯৯' প্রণীত হয়। পরবর্তীতে ২০১৩ সালে কৃষি নীতি সংশোধন করা হয়। বাস্তবতার নিরিখে বর্তমান ও ভবিষ্যৎ চ্যালেঞ্জ মোকাঝিলার উপায়শী করে 'জাতীয় কৃষি নীতি ২০১৮' প্রণীত হয়েছে। এ নীতিতে কৃষি ঝাঙের সমস্যা ও সম্ভাবন, গবেষণা ও উন্নয়ন, কৃষি সম্প্রসারণ, কৃষিতে সমবায়, কৃতি-বিপ্লব, বিশেষায়িত কৃষি, আঞ্চলিক কৃষি, উদ্যা প্রযুক্তি নির্ভর কৃষি, কৃষিতে নদী ও যুবশক্তি, জ্ঞান ও দক্ষতা উন্নয়ন, কৃষি যান্ত্রিকীকরণ সর্বেশরি কৃষিতে নব নব উদ্যোগ ও উদ্ভাবন অন্তর্ভুক্ত করা হয়েছে। প্রাকৃতিক সম্পদের যথাযথ সংরক্ষণ, শস্যের নিবিড়তা বৃদ্ধি এবং উৎপাদনশীল টেকসই কৃষি কবন্ধ প্রবর্তন কৃষি নীতিতে প্রতিফলিত হয়েছে। কাঙ্ক্ষিত লক্ষ্য অর্জন মেধা, দক্ষতা ও প্রজ্ঞার সমন্বয়ের ওপরও গুবুডারোপ করা হয়েছে।

এ নীতি প্রনয়নে সংশ্লিষ্ট মহাশালয় ও সংস্থাসমূহ ঝাড়'ও সর্বধরনের জনসাধারণ ও কৃষক, জন প্রতিনিধি, কৃষি বিজ্ঞানী, সম্প্রসারণ কর্মী, বিভিন্ন শেখাজীসী সংগঠন, এনজিও এবং উন্নয়ন সহযেী সংস্থার প্রতিনিধিদের সুচিন্তিত মতামত গ্রহণ করা হয়েছে।

'জাতীয় কৃষি নীতি ২০১৮' কৃষি গবেষণার মাধ্যমে নতুন নতুন জাত ও প্রযুক্তি উদ্ভাবন এবং তা সম্প্রসারণের মাধ্যমে কৃষির টেকসই উন্নয়ন এবং এসভিজি'র কৃষি সংশ্লিষ্ট লক্ষ্য বাস্তবায়নে সহায়ক হবে

(মোহাম্মদ মঈনউলহীন আবদুল্লাহ)

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1. Introduction

- 1.1 The main source of employment and income of the rural people of Bangladesh is agriculture. About 41 percent of the country's total labor force is directly involved in agricultural occupation. Agriculture contributes to about 15% to GDP of which contribution of crop sub-sector is 9%. Under the direct guidance of the Father of the Nation Bangabandhu Sheikh Mujibur Rahman, various agricultural institutions including Bangladesh Agricultural Research Council, BADC were established and revived, and the scope and dynamics of the agricultural extension service were increased. Consequently, the country achieved self-sufficiency in food grains. As a result of the development of modern varieties and technologies, various fruits and vegetables are produced throughout the year with the increased productivity. Likewise, the BT-brinjal cultivation, developed in the country through biotechnology, has set a unique example in the Asia region. Agriculture development directly involves poverty alleviation of the country. Under this policy, modernization of agriculture has been given importance to achieve poverty alleviation, food and nutrition security and agricultural growth.
- 1.2 Contribution of small farmers to national and family based food security has been increasing gradually. In the past, due to emphasis put in the production of rice, wheat and other grain crops, self sufficiency has been achieved in the production of major cereal rice crop. In order to achieve the nutritional security, this agricultural policy emphasizes the need for diversification of crops including production of high value crops.
- 1.3 In formulating the 'National Agriculture Policy 2018', all the relevant laws, policies, development plans, perspective plans have been examined thoroughly. These include Seed Policy 1999; National Land Use Policy 2001; National Food Policy 2006; National Livestock Development Policy 2007; Bio-safety Guidelines 2008; National Food Policy Action Plan 2008—2015; Country Investment Plan 2011; Plant Quarantine Act, 2011; National Jute Policy 2011; Bio-safety Rules 2012; National Water Act 2013; Food Safety Act 2013; Master Plan for Agricultural Development in the Southern Region 2013; National Nutrition Policy 2015; Perspective Plan (2011—2021); Seventh Five-Year Plan (2016—2020); Sustainable Development Goals (2016—2030); Bangladesh Delta Plan 2100; Fertilizer Management Law 2017; Jute Act of 2017; Integrated Minor Irrigation Policy 2017; National Organic Agriculture Policy 2017; National Pesticides Act 2017; Ground Water Management for Agricultural Activities Act 2018 and Seed Act, 2018. As there are separate policies for other sub sectors of agriculture and the crop sub-sector is the most important one, in continuation of previous practice, this document has been called 'National Agriculture Policy 2018'.

- 1.4 As Bangladesh is a disaster prone country due to its geographical location, stress tolerant crop varieties and production technology needs to be developed and promoted constantly. For this reason, modern techniques including biotechnology and disease resistant and nutritious crop varieties and technologies have to be invented. Moreover, introduction of Crop Zone based crop production system is essential for profitable agriculture. These issues have been given special importance in this policy.
- 1.5 It is a great challenge to continue to increase the production of crops under conditions of declining agricultural land, soil fertility and increasing population. Therefore, it is important to have a special focus on the overall productivity growth. Also, for reducing the difference between research farm and field-level yield, it is necessary to emphasize the importance of innovation and extension of technology.
- 1.6 By exploiting the marine resources and using multi-dimensional means, there is considerable opportunity for developing the living standard of the coastal population and also increasing the export income. If it is utilized through a proper plan, it is possible to make huge progress in agriculture. Production of plankton in the oceans, rivers and wetlands can play a role in the development of agriculture. Plankton protects the environment of water in addition to providing feed of aquatic animals. Besides, it is also used as food of humans, domestic animals and in pharmaceutical industries. In addition to fisheries resources, there are prospects of seaweed cultivation which has been given due importance in this policy.
- 1.7 The agricultural situation has been evaluated for the purpose of formulating the realistic and useful National Agriculture Policy. The existing facilities of agriculture, such as favorable production and research-extension related methods, appropriate technologies, agricultural input supply network, labor force, crop biodiversity, agriculture-friendly policy, production support and experienced farmers are very helpful for the development of agriculture. On the other hand, there is a wide scope for improvement in the fields like development of agricultural education, hybrid and biotechnology expansion, reducing yield difference, increasing production in adverse environment, transfer of sustainable technology, farm mechanization, production and export of high value crops, crop diversification and intensification, integrated nutrition, pest management, agro-forestry, commercial agriculture, establishing agro-industries, women participation, employment generation, income growth, good agricultural practices etc.

- 1.8 There are also some weaknesses in agriculture. These include lack of desired level of productivity, lack of capital, shortage of technologies used in adverse environmental conditions, limited agricultural marketing management, post-harvest loss, limited initiatives in the production of exportable products, inadequate agricultural credit and lack of infrastructural facilities, lack of coordination among farmers co-operatives, weakness in three-dimensional coordination among universities, research institutes and extension departments; slow technology transfer, lack of mobility in agricultural management, lack of scope in agricultural products' transportation and processing, lack of effective land zoning, limited investment etc. Moreover, there is also other risks including climate change, gradually decreasing arable land, environmental degradation, deleterious effects of pesticides residues, declining biodiversity, declining soil fertility, and use of agricultural land for non-agricultural purposes.
- 1.9 To maintain the fertility of land and preserve the sustainable environment, the principles of good agricultural practices including use of organic and chemical fertilizers have received prominence in this policy.
- 1.10 **For the overall development of the crop sector, the quality of agricultural production, fertilizer and irrigation management, biotechnology, farm mechanization, agricultural cooperatives and marketing, women's empowerment in agriculture, natural resource management, specialized agriculture, regional special agriculture, involvement of youth society, agricultural rehabilitation, agro-forestry, safe and nutritious food production, use of information and communication technology etc. including investment in agriculture have been given due importance in the agriculture policy.**
- 1.11 For producing export oriented safe food, emphasis has been given in the policy for providing training to all concerned, including provision of incentive to farmers for practicing organic farming. In addition, the use of information technology has been included in the agriculture policy, outlining the strong coordination between all the local and development partner organizations related to agricultural development, including the delivery of fast extension services.
- 1.12 In view of the climate change phenomena, modernization of agriculture is necessary for achieving sustainable development goals in agriculture, including development of capacity to deal with multidimensional challenges. It is necessary to introduce comprehensive area based pattern and sustainable management of natural resources, including adoption of cropping risk mitigation strategy. The demand for high value crops, including change in food habits is increasing. To cope with this situation, initiatives have been taken to ensure continuous agricultural growth through introduction of Annual Performance Agreement. Considering the current socio-economic context, the existing agricultural policy has been oriented to cope with the need of the time.

- 1.13 In order to achieve the goal and objectives of this National Agriculture Policy 2018, it is essential to ensure effective implementation, monitoring and evaluation of the policy. For this purpose, steps will be taken to monitor and evaluate its implementation activities by adopting precise implementation strategies for short, medium and long run.
- 1.14 'National Agriculture Policy 2013' will be abolished immediately after publication of the 'National Agriculture Policy 2018'.

2. The Goal and Objectives of the National Agriculture Policy

2.1 Main Goal :

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

2.2 Main Objective :

Ensure food security and improve socioeconomic conditions of people by increasing productivity and production of crops, farmers' income, crop diversification, ensuring nutritious and safe food production, improving marketing system, and ensuring profitable agriculture and efficient utilization of natural resources.

2.3 Specific Objectives :

- 2.3.1 Increase availability of food, right to food and purchasing power by increasing productivity and production of crops;
- 2.3.2 Modernize agricultural research, education, extension, input management and develop skilled manpower for sustainable technology innovation;
- 2.3.3 Increase farmers' capability and income through institutional infrastructure development and efficient technology services;
- 2.3.4 Adopt and implement food production plans to meet the needs of nutritious, safe and demand driven foods;
- 2.3.5 Develop agricultural research for promoting export of products through coordination with local and international partner organizations;
- 2.3.6 Provide assistance to the farmers in increasing agricultural production and ensuring marketing facilities of agricultural commodities and obtaining fair prices;
- 2.3.7 Create sustainable agricultural production system by increasing productivity through proper management of natural resources;
- 2.3.8 Reduce the use of physical labor and introduce cost saving farming system through farm mechanization.
- 2.3.9 Create new sectors of agricultural commercialization and employment generation through demand driven and export-oriented agricultural development; and
- 2.3.10 Ensure proper use of water resources through active participation in the formulation of strategies and their proper implementation through inter-ministerial/inter agency coordination.

3. Research for Agricultural Development

Through modern research, the productivity and production of crops need to be increased by developing and using appropriate technology. To achieve this objective, we need to increase knowledge, skills and capabilities in agricultural research by using the international excellence of agricultural science. Emphasis will be given in the development of adaptive and environment friendly varieties, reducing post-harvest loss, encouraging the establishment of agro-based industries, increasing the efficiency of soil and water use, conservation and utilization of the resources, increasing the supply of quality seeds and increasing irrigation efficiency. The development of biotechnology, farm mechanization, socio-economic aspects will be given priority in the research. Along with this, research on nutrition-rich oilseed and other cash crops is also important. In order to face the multi-dimensional challenges of agriculture, the following areas will be given emphasis in research and development.

3.1 Development of Agricultural Research Management:

- 3.1.1 Strengthen coordination between the planning, monitoring and evaluation of agricultural research of National Agricultural Research System (NARS);
- 3.1.2 Avoid duplication of research by establishing 'National Research Database';
- 3.1.3 Take initiative to provide incentives to intellectual researchers and taking steps to preserve intellectual property rights;
- 3.1.4 Take initiative for establishment of a research center in places of important agricultural environment for the development of suitable regional agricultural technology; and
- 3.1.5 Initiate the Advanced Research Methods in the NARS Institutions and Universities and investing in research to take the highest social benefits and value addition from research.

3.2 Planning and Financing:

- 3.2.1 Set priority for Short (1—5 years), Medium (6—10 years) and Long term (11—15 years) research on the basis of national priority;
- 3.2.2 Take steps to provide national/institutional recognition or incentives for innovative work of scientists;
- 3.2.3 Take measures to increase the knowledge and skills of scientists in the interest of strengthening the foundation of agricultural research;
- 3.2.4 Put emphasis on field level needs for research planning and prioritization;
- 3.2.5 Encourage conducting research activities through the participation of public/non-government organizations and universities; and
- 3.2.6 Coordinate and arrange financing for conducting timely research activities.

3.3 Scope and Field of Research:

3.3.1 Variety Development:

- 3.3.1.1 Give importance to modern research in places of conventional methods of research;
- 3.3.1.2 Enhance hybrid and mutation breeding activities for the cultivation of high yielding, nutritious, economically and hygienic crops, and increase the field and periphery of mollicular breeding along with conventional breeding practices;
- 3.3.1.3 Strengthen capacity to develop advance, cold and heat tolerant crops, especially rice varieties in the face of sudden and late flooding;
- 3.3.1.4 Undertake more activities for the development of the main crop through biofertilization;
- 3.3.1.5 Strengthen research activities by NARS institutions for the development of intensive varieties and technologies;
- 3.3.1.6 Encourage development of crop varieties to meet the preference of special categories of consumers;
- 3.3.1.7 Strengthen research activities in the development of cold tolerant and drought tolerant rice, wheat, jute etc.;
- 3.3.1.8 Promote development of nutritious, non-conventional crops (kaun, sugar, arahar, sarogam, barley, phelan, jam potato, tree potato) in the hostile environmenst;
- 3.3.1.9 Strengthening of research in the production of jute and jute goods;
- 3.3.1.10 Strengthen research activities on jute following discovery of gene sequence of jute;
- 3.3.1.11 Increase the productivity of crops by increasing the efficiency of photosynthesis through the use of sunlight in coordination and collaboration with domestic and international agricultural research.

3.3.2 Biotechnological Research:

- 3.3.2.1 Undertake research activities on identification and relocation of genetically controlling agronomic properties including high yield;
- 3.3.2.2 Strengthen 'breaking yield ceiling' research activities;
- 3.3.2.3 Improve the genomics research programs for development of varieties suitable for adverse environmental conditions;
- 3.3.2.4 Take initiatives for establishing and preserving Gene Bank and agricultural information of agricultural crops; and
- 3.3.2.5 Encourage the scientists to undertake fundamental research programs for developing stress tolerant variety.

3.3.3 Nano Technology:

- 3.3.3.1 Take initiative to use nano technology to determine crop diseases, crop specific nutritional needs and increase nutrient utilization capacity;
- 3.3.3.2 Use nano sensor technology to monitor the quality of the land and to increase crop productivity; and
- 3.3.3.3 Take initiatives for attaining input use-efficiency through innovation and use of nano technology based fertilizers, pesticides and innovation, including identification and elimination of heavy metals in agriculture.

3.3.4 Genetic Resources:

- 3.3.4.1 Strengthen collection, preservation, reproduction, exchange and evaluation of genetic resources from local and foreign sources through institutional initiatives;
- 3.3.4.2 Take initiative to increase the physical and technical facilities suitable for the conservation of genetic resources;
- 3.3.4.3 Take measures to preserve crop diversity and strengthen monitoring activities to prevent loss, extinction and smuggling of genetic resources;
- 3.3.4.4 Creation of scientific database for evaluation of genetic resources and use those for varietal development; and
- 3.3.4.5 Encourage the search and use of desired properties of the preserved genetic resources.

3.3.5 Microbiological Research:

- 3.3.5.1 Identification of important microbes in agriculture, characterization and put emphasis on their proper selection;
- 3.3.5.2 Undertake research related to increase of the effectiveness of microorganism; and
- 3.3.5.3 Encourage all concerned to set up agricultural microbiological research industry.

3.3.6 Climate Change, Stress Tolerant Varieties and Technology:

- 3.3.6.1 Strengthen activities for determining impact of climate change on various crops and natural resources;
- 3.3.6.2 Strengthen research in the production of low greenhouse gas emissions crop technology and cropping pattern;
- 3.3.6.3 Strengthen research activities for innovative, cost effective and profitable farming technologies suitable for adverse environment;
- 3.3.6.4 Accelerate the development of effective technologies suitable for adverse soil water-fertilizer-crop management practices; and

3.3.6.5 Encourage and provide assistance to non-governmental organizations in the development of stress tolerant varieties and technologies.

3.3.7 Economic, High Value and Horticultural Crops and Applied Nutrition:

3.3.7.1 Develop cash earning, high value, nutritious and short duration crop varieties and technologies to meet the demand of local and export markets;

3.3.7.2 Continue search for development and adaptation of technologies for local and foreign fruits, vegetables and flower production;

3.3.7.3 In addition to following conventional method, strengthen research activities related to the development, processing, packaging and transportation including use of hybridization system for vegetables, spices, flowers, ferns and cosmetic plant species;

3.3.7.4 Put emphasis on the development of early and late maturing varieties of fruits for increasing their year-round availability;

3.3.7.5 Undertake research activities for development of crop varieties and technologies suitable for hill environments;

3.3.7.6 Undertake research activities for the cultivation of high yielding new varieties of mustard, canola, sesame, linseed, sunflower etc.

3.3.7.7 Undertake special research activities in the production and processing of plants, creepers / shrubs possessing herbal traits;

3.3.7.8 Strengthen food based applied research on nutrition for improving nutrition security through improvement of dietary diversity and preservation of nutritional value of food.

3.3.8 Research on Natural Resource Management:

3.3.8.1 Discourage use of agricultural land for human settlement and encourage housing and one house one farm practice;

3.3.8.2 Strengthen the research on monitoring changes in the quality of and increasing soil fertility;

3.3.8.3 Further strengthen the activities on use of proper doses of fertilizers based on examination of soil fertility at local levels;

3.3.8.4 Strengthen research on problems related to soil management;

3.3.8.5 Strengthen research on balanced and efficient use of natural resources; and

3.3.8.6 Ensure production of profitable crops through crop modeling research, speed up search for availability of quality of land and natural resources in different locations.

3.3.9 Unconventional and Unseasonal Crops:

- 3.3.9.1 Strengthen development activities on unconventional and unseasonal nutrient-rich crops; and
- 3.3.9.2 Undertake special research program for production of unconventional and unseasonal crops for increasing their value addition.

3.3.10 Improvement of Agricultural Inputs:

- 3.3.10.1 Undertake research activities on the strategy to increase the availability of new, potential and popular varieties of seeds;
- 3.3.10.2 Strengthen research in the management of quarantine and prevention of seed borne diseases in the development of overall seed management;
- 3.3.10.3 Undertake research activities for the development of new methods of application of fertilizer to increase efficiency and productivity; and
- 3.3.10.4 Undertake effective research in the development of new methods for improving irrigation efficiency.

3.3.11 Innovation of Farming and Management Technology:

- 3.3.11.1 Put emphasis on inventing or introducing the profitable farming method for the already introduced crops;
- 3.3.11.2 Ensure availability of information related research facilities and technologies for the released crop varieties;
- 3.3.11.3 Strengthen research for the development of crop based organic farming and the related cultural practices;
- 3.3.11.4 Undertake more on-farm research at farmers' level for the development of successful cultural practices.

3.3.12 Crop Zoning:

- 3.3.12.1 Introduce modern techniques like GIS, remote sensing, use of land and soil information-data, for regional crop and land-related geophysical zoning;
- 3.3.12.2 Undertake research work on verification and development of crop zone based productivity; and
- 3.3.12.3 Provide incentives to farmers to use crop zone based farming for increasing production and income.

3.3.13 Pest Management:

- 3.3.13.1 Undertake research activities in identification of new pest and environmentally friendly pesticides;
- 3.3.13.2 Strengthen research activities for developing effective prevention system;

- 3.3.13.3 Encourage research for developing methods for biological control of pesticides;
- 3.3.13.4 Undertake research and strengthen monitoring activities for prevention of cross border transmission of pests and diseases;
- 3.3.13.5 Take steps to increase research/training/awareness to ensure the safe use of pesticides; and
- 3.3.13.6 Take measures to determine the maximum level MRL after use of the approved pesticides.

3.3.14 Farming Systems Research:

- 3.3.14.1 Conduct research activities in the development of efficient use of farm related places (homestead, roof-top, pond side etc.) for increasing the income of the farmers;
- 3.3.14.2 Undertake research activities in the development of the area based nutritious and profitable crops including the development of the existing crop lines;
- 3.3.14.3 Strengthen research related to integration of crop-water-fisheries and agro forestry; and
- 3.3.14.4 Strengthen nationwide farming system research activities by identifying possible partners and identifying input saving crops and cropping systems.

3.3.15 Post-harvest Technology:

- 3.3.15.1 Strengthen research and develop activities of crop harvesting, processing, handling, transportation, packaging and storing;
- 3.3.15.2 Prioritize research and development activities on post-harvest loss reduction; and
- 3.3.15.3 Encourage building of crop-based warehouses, air-conditioned warehouses and multipurpose cold storages to maintain the quality of the produce according to the demand of the area.

3.3.16 Crop Diversification, Increase of Cropping Intensity and Minimization of the Yield Difference:

- 3.3.16.1 Strengthen research on crop diversification for increasing consumer demand, nutrition supply, land fertility and income;
- 3.3.16.2 Strengthen research activities related to relay and mixed cropping pattern for increasing income of farmers;
- 3.3.16.3 Take initiatives for crop diversification by strengthening research on reduction of yield gap by encouraging soil-water-crop management; and
- 3.3.16.4 Increase cropping intensity and crop diversification by maintaining fertility of the land for increasing farm income.

3.3.17 Research on Agricultural Mechanization:

- 3.3.17.1 Emphasize the need for improving equipment/energy saving equipment in the development of agricultural machinery;
- 3.3.17.2 Strengthen research activities to increase utilization of renewable energy in irrigation/agricultural machinery;
- 3.3.17.3 Encourage innovation and production of affordable agricultural machinery considering the socio-economic condition of the farmers; and
- 3.3.17.4 Strengthen research for determining suitability use of imported agricultural machinery.

3.3.18 Socio-economic Research:

- 3.3.18.1 Give priority to policy related research by analyzing constraints to adoption and use of agricultural inputs and technologies considering the socio-economic impacts of the technologies and practices including input supply, market prices, farmers' income, crop diversification and production assistance to farmers;
- 3.3.18.2 Strengthen research on assessment of suitability and acceptability in the evaluation of agricultural technologies through field level investigation;
- 3.3.18.3 Strengthen marketing research aiming at devising means to facilitate marketing of quality agricultural products;
- 3.3.18.4 Undertake research on land ownership, classification, identification of suitability of proper use of land for uninterrupted crop production; and
- 3.3.18.5 Encourage micro and macro level studies for improving efficiency in production and marketing of agricultural commodities.

3.3.19 Technology Dissemination Strategy:

- 3.3.19.1 Take initiatives for increasing involvement of the scientists with out-station extension activities by the NARS institutes;
- 3.3.19.2 Give emphasis on refinement and transfer of technologies by the research institutes by improving relationships with the beneficiaries.

4. Technology Transfer and Agricultural Extension

To ensure sustainable agricultural production, it is important to develop agricultural extension services and institutional capacity to achieve nutritional security through technology transfer and agricultural commercialization. In order to enhance increased production, income and efficiency, the extension service provider will provide advice on better farm practices and techniques, including providing information, technology and advice on technical matters and farm management to the farmers. To achieve the main objectives of extension, communication methods and steps to be taken to make agricultural extension services more efficient and effective, the following strategies will be followed:

4.1 Main Objectives of Extension:

- 4.1.1 Provide demand-based extension services to all types of farmers (landless, marginal, small, medium and large farmers);
- 4.1.2 Make women and youth active and interested in agriculture through special initiatives;
- 4.1.3 Encourage participation of private and voluntary organizations in the field of agricultural extension;
- 4.1.4 Develop and expand urban-centric agricultural extension;
- 4.1.5 Decentralize and diversify extension activities aimed at providing efficient and integrated services to the farmers' doorstep;
- 4.1.6 Make extension workers efficient and active in dealing with natural disaster;
- 4.1.7 Take effective initiatives for preparation and implementation of demand-based seasonal and annual production plans; and
- 4.1.8 Take measures for coordination of sustainable, profitable, cost effective production and marketing systems of crops.

4.2 Communication Method:

- 4.2.1 Strengthen extension services through local/regional/ national level agricultural technology expansion consisting of research and extension organizations and take necessary measures for this purpose;
- 4.2.2 Take steps for updating and implementing extension activities in replacing old varieties with new ones according to the decision of the technology expansion coordination committee;
- 4.2.3 Develop an evaluation system in the exhibition set up for expansion of technology by including participation of all stakeholders and considering consumer demand and other matters;
- 4.2.4 Use technology based on field evaluation and hand-over the results to the research institutions for the development of technology;
- 4.2.5 Strengthen agricultural research and extension relations and enabling and implementing knowledge of each other through participation in all activities related to workshops, meetings, monitoring etc.;
- 4.2.6 Encourage farmers to cultivate crops by following the guidelines of fertilizer recommendations based on soil quality;
- 4.2.7 Ensure of sustainable technology through the development of research-extension-farming relations;
- 4.2.8 Ensure uninterrupted expansion of technology by establishing block transfer of agricultural technology;
- 4.2.9 Develop new areas of community/community-based extension services and take measures for their implemented;

- 4.2.10 The local extension workers will play the role of primary sources in providing information and advice;
- 4.2.11 Extension services will be popularized by organizing 'Farmer School', 'Farmer Rally', 'Field Day' etc. by increasing farmer connectivity;
- 4.2.12 Ensure the expansion of e-agriculture for the holistic use of modern information and communication technology; and use mass media to spread the technology; and
- 4.2.13 Farmer's interests will be given priority to make the extension services fruitful, 'Lab to Land', 'Science to Society', 'Information Friend/Technological Agent' and other innovative expansion strategies will be adopted to strengthen extension.

4.3 Scope of Extension:

- 4.3.1 Implement cropping pattern and extension services suitable for local condition to increase climate resistant and sustainable crop production;
- 4.3.2 Encourage production and management of certified quality of seed (TLS) at farmers' level;
- 4.3.3 Undertake programme on jute cultivation by expanding the improved varieties of jute.
- 4.3.4 Strengthen the quality of extension services for enhancing diversification with high value crops;
- 4.3.5 Put special emphasis on production and expansion of safe horticulture/field crops in the field of fruit production and adopt better agricultural practices for ensuring nutrition security;
- 4.3.6 Rapidly expand the technologies developed to combat production risk including reducing the yield difference of field crops;
- 4.3.7 Accelerate the expansion of the technologies adopted for reducing the use of groundwater in agriculture and better management of soil and water;
- 4.3.8 Put special emphasis on production of pulses, oil seeds (mustard, canola, sesame, linseed, sunflower, etc.) and spices for ensuring income and nutritional security of the farmers;
- 4.3.9 Enhance extension programs for the cultivation of improved varieties of jute invented through research;
- 4.3.10 Increase the use of biological /green/microbial fertilizers and production technology on priority basis for soil health protection;
- 4.3.11 Strengthen services related to agricultural mechanization and expedite agro processing techniques;

- 4.3.12 Take steps to increase the infrastructural and technical capacity of the relevant government institutions to provide innovative and effective extension services and enhance the technical capacity of the concerned private sector organizations; and
- 4.3.13 Take steps to increase income by expanding fruit gardens with mixed, relay and inter-crop cultivation.

4.4 Inclusive Participation:

- 4.4.1 Encourage government-private partnerships to expand demand-based technology in the production, preservation and marketing of agricultural products at national, regional, district, upazila and union level;
- 4.4.2 Strengthen the cooperative efforts among NARS institutes, extension organization, universities and non-government organizations relating to adaptation research and extension;
- 4.4.3 Adopt strategies for providing extension services at upazila and union levels with assistance from local government;
- 4.4.4 Undertake program for replacement of farmers' seeds by quality seeds; and
- 4.4.5 Encourage participation of farmers and local people in the selection of promising varieties doing applied research.

4.5 Disaster Combat and Crop Protection:

- 4.5.1 Provide emergency special services for expansion of new agricultural technology based on urgent need;
- 4.5.2 Bring disaster-prone, char land and non-agricultural land under special agriculture program;
- 4.5.3 Develop integrated environment friendly technology and extension services in a coordinated manner;
- 4.5.4 Destroy completely the crops affected by deadly diseases and stop collection of seed from the disease affected crops;
- 4.5.5 Provide agricultural inputs to farmers through disaster relief and agricultural rehabilitation; and
- 4.5.6 Develop advance forecasting system about natural disasters and crop protection measures through early warning activities.

4.6 Local Knowledge/Technology and Experience:

- 4.6.1 Take measures for refinement and spread of locally adaptive technologies and knowledge after proper evaluation;
- 4.6.2 Take initiatives to expand the area-based adaptation mechanism and increase the cultivation of local high value crops and follow the profitable cropping practices; and

4.6.3 Strengthen activities of increasing crop production through the use of local agricultural technologies in the risk prone areas.

4.7 Farmers' Association/Club:

4.7.1 Promote community-based farmer party/club and provide encouragement to take technology services;

4.7.2 Encourage farmers' through Information and Counseling Center (FIC) etc. to solve the immediate problems related to Integrated Pest Management (IPM) and Integrated Crop Management (ICM);

4.7.3 Provide emergency production/material support/incentive through farmers clubs;

4.7.4 Form mechanization teams in agricultural machinery distribution program with development assistance; and

4.7.5 Involve existing groups in providing e-farming services.

4.8 Seed Technology:

4.8.1 Farmers interested in the production and use of improved seeds will be encouraged with assistance from seed producing organizations to produce and use seeds;

4.8.2 Seed exchange among farmers will be encouraged to promote quality and good variety of seeds.

4.9 Quality Assurance of Seed and Crop:

4.9.1 Measures will be taken to free seeds from diseases during production, processing and marketing of seeds;

4.9.2 Quarantine services will be strengthened according to demands of the import and export markets.

5. Agricultural Inputs

It is particularly important to ensure quality materials for achieving agricultural growth. By providing huge support to ensure balanced fertilizer use, the price of urea and other chemical fertilizers has been kept within the purchasing power of the farmer. Farmers are constantly encouraged to use fertilizers to maintain soil fertility and they are also encouraged to use organic fertilizers. Integrated pest management system has been adopted for safe food production. Actions have also been taken for efficient irrigation management. Improvement of efficiency, environment protection and management in the use of inputs can be ensured by implementing the following activities:

5.1 Seed, Seedlings and Grafting:

Currently, significant quantities of quality seeds of different crops are supplied from the public sector. Private seed producers are mainly involved in the supply of hybrid varieties of rice, maize and vegetable seeds. The following steps will be taken for the development and supply of improved seeds, seedlings and grafts:

5.1.1 Development and Maintenance of Seed Management:

- 5.1.1.1 Encourage government, non-government organizations and individuals /companies in the field of production and import of seeds for the development and growth of seed use;
- 5.1.1.2 Promote private organizations as well as government organizations in the production/marketing of varieties of seeds introduced by government research institutions;
- 5.1.1.3 Ensure the quality of seed management in production and marketing of seed by public and private sector through direct supervision of the seed certification agency;
- 5.1.1.4 Any person or non-governmental organization may be involved in activities related to seed development, registration, import, export and marketing, subject to the prior approval of the government;
- 5.1.1.5 Take measures to increase the production capacity of breeding / foundation seeds by the innovative organizations for meeting the demand for quality seeds;
- 5.1.1.6 Promote public and private sectors in seed production, processing, preservation, quality control and marketing activities;
- 5.1.1.7 Take effective measures to increase the institutional capacity of plant quarantine in seed/seedling/sapling-import/export and follow the relevant rules;
- 5.1.1.8 Increase seed availability at local level through the establishment of seeds village in coordination with the organized farmers and entrepreneurs to produce and preserve quality seeds; and
- 5.1.1.9 Follow the policy on contractual farming in the production, preservation and quality control, and adopt initiatives to increase the efficiency of the farmers.

5.1.2 Seed Multiplication, Distribution and Seed Industry:

- 5.1.2.1 Emphasize the growth of breeding and foundation seed production order to increase the availability of certified and transmitted seeds;
- 5.1.2.2 Encourage every breeder/seed-growing farmer to face the disaster, to encourage the farmers to make an emergency stock;
- 5.1.2.3 Provide necessary support as possible to the farmers by obtaining certified seeds of the government and private seed producers;
- 5.1.2.4 Increase the capacities of contract farmers in the production of quality seeds in government and non-government sectors;
- 5.1.2.5 Undertake regular training in the production, processing and preservation of farmers' seeds through government and non-government organizations; and
- 5.1.2.6 Encourage production and distribution of quality horticultural crops, saplings and seeds.

5.2 Fertilizer (chemical, organic and bio):

To strengthen fertilizer management, the following steps will be followed:

5.2.1 Collection, Storage, Distribution, Quality Control and Monitoring:

- 5.2.1.1 Continue the process of keeping fertilizer prices within the purchasing capacity of farmers by providing development assistance;
- 5.2.1.2 Arrange for intensive monitoring at each level to ensure strict control and supply, warehousing, price and quality of the approved standards of fertilizer;
- 5.2.1.3 Establish facilities for emergency stock of fertilizers at the regional, district and upazilla level;
- 5.2.1.4 Bring all activities under the digital system by strengthen the institutional facilities of quality analysis at local level;
- 5.2.1.5 Identify the strategic location, ensuring the stock of fertilizer at local levels for quick distribution; and
- 5.2.1.6 Encourage farmers to use balanced fertilizer, especially the fertilizers containing multiple nutrient elements.

5.2.2 Organic, Green and Bio-fertilizers:

- 5.2.2.1 Encourage the use of green fertilizer/organic fertilizers to increase the fertility of the soil and the use of bacterial fertilizers in pulses;
- 5.2.2.2 Encourage marketing and use of microbial fertilizers invented through research;
- 5.2.2.3 Encourage farmers to participate in training programs in the use of organic and chemical fertilizers in balanced manner;
- 5.2.2.4 Increase the availability of organic fertilizers and encourage farmers to rear cattle in the household for increasing supply of renewable energy; and
- 5.2.2.5 Encourage manufacturing of organic, green and microbial fertilizers and provide special incentives to the users.

5.3 Pest Control and Pesticide Management:

- 5.3.1 All extension and NARS institutions will monitor the presence of pests and loss of crop pests round the year;
- 5.3.2 Strengthen pesticides registration, marketing and monitoring activities;
- 5.3.3 Discourage import and use of pesticides that are harmful to the beneficial insects;
- 5.3.4 Extension workers, farmers/dealers will have to avoid pesticides related accidents and will create awareness regarding medical support;

- 5.3.5 Encourage the farmers to use organic pesticides; and
- 5.3.6 Promote use of environment-friendly, safe and effective pesticides categorized as Class-3, by World Health Organization (WHO).

5.4 Irrigation and Water Management:

Increasing use of ground water and good use of limited underground water has special significance in maintaining the balance of the environment and reducing the cost of irrigation. To increase the availability and utilization of ground water, there are ongoing activities including establishment of rubber dam in the canal, small and medium rivers. In order to increase the level of underground water and to get enough water for irrigation during the dry season, monsoon is being given preference for preservation of underground water along with rain water. Initiatives have been taken to increase the crop productivity and crop intensity through inclusion of water saving crops and cropping patterns. The following steps will be taken to introduce efficient irrigation system and to reduce the cost of irrigation facilities:

5.4.1 Irrigation Efficiency and Water Productivity:

- 5.4.1.1 Encourage use of pipelines instead of irrigation drains in all possible areas of irrigation for the use of moderate water resources subject to evaluation of water availability;
- 5.4.1.2 Increase irrigation efficiency for the development of water utility and productivity to ensure regular use of water resources;
- 5.4.1.3 Achieve the priority of irrigation water resources, and to undertake the activities of sustainable water use technology;
- 5.4.1.4 Emphasize the balanced use of ground water and underground water and encourage the cultivation of less water-consuming crops in drought prone areas;

5.4.2 Planning and Monitoring:

- 5.4.2.1 Prepare the irrigation management zone plan for the entire country in a phased manner considering the availability of surface/underground water and considering the area and sector-based future demand as per geological/geophysical features;
- 5.4.2.2 Consider the use of water balance model for determining the demand for water in agriculture, including agriculture and geographical area, recycling and expansion of future irrigation;
- 5.4.2.3 Provide early information on regular updating and analyzing the information about the quality of underground water, monitoring the water level and information related to the map, water management methodology, sea surface elevation and brackish water intrusion; and
- 5.4.2.4 Formation of 'water management organization' in the management and involvement of local beneficiaries in water management.

5.4.3 Conservation and Utilization:

- 5.4.3.1 Take necessary measures to increase availability of ground water through the collection/storage of rain water;
- 5.4.3.2 Ensure better use of water through dug wells/underground irrigation canals, construction of sustainable irrigation infrastructures, pavement and tape pipes;
- 5.4.3.3 Reduce irrigation costs and increase efficiency in the use of water by introducing pre-paid meter in the use of underground water;
- 5.4.3.4 Increase productivity through the introduction of new crops along with Aus, Aman and vegetable by increasing the supplementary irrigation coverage and introducing new grains;
- 5.4.3.5 Take initiatives to use recycled water used for industrial purpose;
- 5.4.3.6 Take initiative for excavation of canal, bills, ponds, and reclamation of water bodies for the purpose of conservation, drainage and proper utilization of surface water in collaboration with concerned ministries/agencies;
- 5.4.3.7 Adopt measures for optimum utilization of water and take measures for judicious use of underground water in the water scarce areas;
- 5.4.3.8 Encourage use of solar energy to conserve and maintain rainwater in dug wells; and
- 5.4.3.9 Increase the use and storage of irrigation water by installing rubber dams and other types of dams in small and medium rivers.

5.5 Energy for Irrigation:

- 5.5.1 Provide electricity at an affordable price to irrigation installations on priority basis;
- 5.5.2 Provide assistance to fuel used for irrigation in possible cases;
- 5.5.3 Encourage use of renewable energy including solar energy;
- 5.5.4 Encourage the production/import of solar panels for the use of irrigation and provide credit and other incentives; and
- 5.5.5 Ensure use of the solar energy for other purposes during periods when the energy is not used for irrigation.

5.6 Small Scale Irrigation Equipment Ownership and Agricultural Credit:

- 5.6.1 Encourage joint ownership of irrigation equipment;
- 5.6.2 Take measures to provide crop and seasonal credit to increase interest in farming of small and medium farmers; and
- 5.6.3 Take measures to waive interest for farmers affected by disasters and arrange for providing them new credit or production support.

6. Farm Mechanization

Although there is significant increase in the use of agricultural machinery in land tillage, pest management and crushing operations, there is scope to increase its coverage. Moreover, mechanization in planting and harvesting has not been up to expected level. Since agricultural mechanization leads to saving of time, increase in production, decrease of production costs and increase in production efficiency, the following steps will be taken to accelerate the mechanization process:

- 6.1 Give special emphasis on development and use of environment friendly and small agricultural equipment;
- 6.2 Provide appropriate support to suitable agricultural machinery manufacturing plants and industrial establishments;
- 6.3 Provide necessary facilities for assessing the quality of agricultural machinery and provide assistance in the development of skilled manpower at the rural level;
- 6.4 Make agricultural machineries at reasonable prices to speed up and popularize farm mechanization and to take measures for providing necessary loans to producers and users;
- 6.5 Introduce farm mechanization through special stimulating assistance in the disaster prone areas;
- 6.6 Strengthen monitoring activities to maintain the quality of the domestically produced and imported agricultural machinery in the country for sustainable farm mechanization; and
- 6.7 Provide overall support to the development of entrepreneurs' parties providing integrated farm mechanization services at local levels.

7. Knowledge and Skill Development

Efficient human resources are essential for developing innovative technologies, institutional skills and entrepreneur development. It is possible to develop skilled human resources by introducing a system of reward for work-based training and important contributions. In order to achieve professional skills, the implementation of appropriate training and education package-based programs will accelerate agricultural development activities. The following activities will be undertaken for the development of knowledge and skills:

7.1 Human Resources Development:

7.1.1 Training Stakeholders:

- 7.1.1.1 Bring all concerned under training including agricultural researchers, extension experts and extension workers; and
- 7.1.1.2 Organize regular training for everyone employed in upholding professional skills, professionalism and high standards.

7.1.2 Training Coverage:

- 7.1.2.1 Provide training in all sectors including **successful application** innovations and research in agriculture;
- 7.1.2.2 Organize season-based training and provide team-based training to farmers;
- 7.1.2.3 Provide training on safe food production, crop diversification, integrated nutrition management etc.;
- 7.1.2.4 Give special priority on training of women and youth for attracting them in agricultural work; and
- 7.1.2.5 Train the scientists and extension workers on modern scientific knowledge and technology (GIS, remote sensing, crop modeling, information and communication system etc.).

7.2 Transfer of Technology:

- 7.2.1 Enhance the extension skills by organizing regular workshops, seminars, exchange of views and training, with the participation of extension workers to expedite the problem solving and technology transfer;
- 7.2.2 Expedite the rapid dissemination of new innovative technologies, the inventing agencies will undertake special activities and develop and evaluate the usefulness of the technology; and
- 7.2.3 The researchers and expansionists will jointly undertake and implement research plans in the process of inventing effective technology transfer methods.

7.3 Subject Matter of Training:

7.3.1 Skill Development:

- 7.3.1.1 Continue to **increase** the capability of scientific, technical and management skills **and** increase the capacity of institutions;
- 7.3.1.2 Provide **higher education and training** to scientists in developing knowledge **by taking into account the climate** change, adaptation and disaster mitigation;
- 7.3.1.3 Arrange for regular **professional training** in research management skills development, **resource investment** strategy management, project formulation, implementation, monitoring, evaluation etc.;
- 7.3.1.4 Enhance institutional capacity to ensure training of national and international standards by identifying the skill gap;
- 7.3.1.5 Enhance development and exchange of skill by increasing connection among research-expansion-agricultural education institutions and farmers;

- 7.3.1.6 Identify training needs and develop upazila training manual to provide field-based training to field extension workers;
- 7.3.1.7 Impart training to the farmers, and other related persons to increase sustainable natural resource management and efficiency;
- 7.3.1.8 Improve efficiency of partners through training regarding technology expansion, reduction of post-harvest loss, information and communication technology, crop modeling, milling breeding, safe food, demand assessment, value addition, salinity/drought/water management, agricultural trade, seed management, preservation of intellectual property etc.; and
- 7.3.1.9 Organize special training for reducing the difference in knowledge and reduction of yield gap.

7.3.2 Employment Generation:

- 7.3.2.1 Provide encouragement and training to private entrepreneurs and young people in the field of irrigation and management of agricultural machinery, production of high value crops, water management, processing, agricultural business, contract farming, agricultural commodity transportation, fruit gardening and maintenance activities.
- 7.3.2.2 Impart necessary training to the public and private entrepreneurs/farmers about seed production/production of crops/nursery business, seed production, preservation, quality control and seed marketing/business management; and
- 7.3.2.3 Encourage entrepreneur development and income generating activities of farmers by providing training in making organic fertilizers and vermicompost.

7.3.3 Motivation and Incentives:

- 7.3.3.1 Institutionalize the award for encouragement and recognition for excellence in education and training, research, extension, crop production and agricultural development activities; and
- 7.3.3.2 Take initiatives to provide special incentives for attracting and retaining the talented persons in agricultural profession.

7.3.4 Education:

- 7.3.4.1 Give importance to modern agricultural education and practical education;
- 7.3.4.2 Prepare the syllabus as per need of field oriented and efficient extension services, enhance diploma curriculum and increase capacity of public and private institutions;

- 7.3.4.3 Create opportunities for higher education in agriculture, and regularly revise the need-based syllabus;
- 7.3.4.4 Encourage higher education on local and national agricultural issues;
- 7.3.4.5 Take steps to develop the National Agricultural Training Academy as a center of excellence for capacity building and development of human resources; and
- 7.3.4.6 Take necessary steps to prioritize the advanced sophisticated knowledge-science, food and nutrition, climate change, adaptation strategies, etc. in agricultural education.

7.3.5 Innovation:

- 7.3.5.1 Encourage innovation activities in all areas to accelerate agricultural development; and
- 7.3.5.2 Institutionalize provision of incentives through recognition of the devised innovation in the areas of research, extension, education and technologies relating to use of agricultural inputs.

8. Agricultural Environment and Natural Resources Management

Agricultural production is largely dependent on proper agricultural environment and natural resource management. The following steps will be taken to ensure the scientific use of sustainable natural resources for different environments to achieve food and nutritional security:

8.1 Agricultural Environment and Natural Resources Management:

- 8.1.1 Discourage use of agricultural land for non-agricultural purposes to ensure sustainable food security;
- 8.1.2 Increase the agricultural land by recovering the coastal land along with recovery of waterlogged land;
- 8.1.3 Strengthen the activities of enhancing the cost saving / stress tolerant crops as special arrangements for mitigation, adaptation of the growing saline and other adverse effects;
- 8.1.4 Adopt local crop production and soil conservation measures for the use of hill land in agriculture;
- 8.1.5 Initiate measures to protect the soil, water, plant, animal life and overall environment;
- 8.1.6 **Initiate** the implementation of adopted policies, plans and strategies **to reduce** the risk of disaster;

8.1.7 Reduce the risk of climate change impact, adaptation and disaster risk, take action to include and implement policies and plans of the main sectors of the government; and

8.1.8 Adopt policies and plans to create 'Disaster Risk Management Fund' in the Ministry of Agriculture.

8.2 Changed Climate and Agriculture:

8.2.1 Environment-friendly Technology:

8.2.1.1 Encourage and motivate everyone in the use of environment friendly technology for sustainable production;

8.2.1.2 Welcome socio-economic rehabilitation activities including infrastructure development by private and international organizations in disaster prone areas; and

8.2.1.3 Take initiatives to produce healthy and strong seedings under controlled conditions to face the hostile environments.

8.2.2 Conservation of Environment and Natural Resources:

8.2.2.1 Follow consistent practices of integrated nutrition pest/crop management for durable natural resource management /conservation:

8.2.2.2 Encourage the farmers to preserve the traditional and non-traditional crops for cultivation:

8.2.2.3 Provide assistance for the production of compost manures through kitchen waste management in municipal areas:

8.2.2.4 Take necessary measures to protect soil microorganisms and encourage farmers to follow the minimum tillage procedure:

8.2.2.5 Take steps to increase and preserve organic matter in the soil by using compost /vermicompost, farmyard manure, chicken droppings, vegetable waste, recycling of crop residues and using 'bio-slurry and biochar';

8.2.2.6 Take effective measures to protect the health of soil and prevent pollution by other heavy metals including arsenic:

8.2.2.7 Encourage pest control by changing crop sowing /cutting time, light trap, trap crop, resistant variety, sex pheromone etc.:

8.2.2.8 Take measures for the utilization/propagation of the beneficial insects, at farm levels;

8.2.2.9 Promote development and use of organic pesticides produced locally through the use of sub-species and native natural raw materials;

8.2.2.10 Strengthen the control method of the source of irrigated water pollutants;

- 8.2.2.11 Follow care system to reduce the use of weedicide and create awareness about weed control and by using micro-organisms and natural enemies;
- 8.2.2.12 Ensure use of pesticides in sustainable environment and conservation of natural resources and strengthen monitoring of adulteration in the agricultural inputs;
- 8.2.2.13 Encourage cultivation/use of aquatic mimosa to reduce evaporation of open water and pond water; and
- 8.2.2.14 Ensure environmental protection and soil health through introduction of fertilizer application deeper into the soil.

8.3 Forecasting and Preparation for Adverse Weather Condition and Pest Attack:

- 8.3.1 Take initiative to modernize and strengthen hostile weather forecasting system at local level;
- 8.3.2 Monitor situation and provide forecast of information on the outbreak /growth of disease round the year through promotion of advanced and responsible forecasting system; and
- 8.3.3 Encourage all concerned to take necessary initiatives including preparation of crop calendars, seed distribution and follow-up to face the post-disaster situations.

8.4 Agro-forestry:

- 8.4.1 Take steps to expedite extension, research and evaluation on economic benefits and risk of adopting various components of agro-forestry;
- 8.4.2 Ensure active participation of local people, particularly women and take initiatives to increase awareness about the benefits of agro-forestry;
- 8.4.3 Invent profitable agricultural forestry management system by using conventional crops, forest resources and livestock practices;
- 8.4.4 Popularize agriculture/social forestry by cultivating suitable vegetables / fruits/spices beside the roads and embankments;
- 8.4.5 Encourage agricultural forestry in the mitigation of natural disaster and take initiatives to plant affordable and environment friendly plants as a driver of agricultural forestry; and
- 8.4.6 Take integrated activities with the forest department, forest research institute and universities, including the Department of Agricultural Extension to promote agro-forestry.

9. Agriculture for Special Area

Crop production in the drought prone north-western part of the country, cold stricken northern region and in the hilly areas of the south-eastern region is risky. The main obstacles to crop production in the coastal south and southwestern regions are intrusion of salinity in soil and water, tides, floods and cyclone. On the other hand, the coastal water control dams (Polder), established in the seventies /eighties have given rise to different forms of natural resource management in the southern region. In order to transfer sustainable technology innovation and adaptive measures in the country, the following steps will be taken on priority basis:

9.1 Coastal Agriculture:

Along with sustainable agricultural technology, introduction of soil and water salinity management and salt tolerant crops, the following initiatives will be taken for expansion of productivity enhancement strategies:

- 9.1.1 Bring uncultivated land under cultivation for introducing location specific crops and cropping patterns and increasing farmers' income;
- 9.1.2 Introduce crops in suitable coastal areas (mung, maize, watermelon, sweet potato, cotton, wheat, ground nut, sunflower, cauliflower, cabbage, carrot, gourd and sweet gourd); and
- 9.1.3 Take measures for conservation of irrigation through repair and reconstruction of dam/monsoon dam, water control infrastructure and planting of water suitable for irrigation through coordination of government and stakeholder effort;
- 9.1.4 Put special emphasis on research for developing 50 cm or more longer rice seedlings suitable for tidal areas;
- 9.1.5 Increase productivity and income by cultivating fish in paddy fields and expand cultivation of vegetables and fruits on the banks of the ponds and ghers;
- 9.1.6 Increase cultivation of vegetables and fruit trees in homesteads (coconut, betel nut, guava, cauliflower, amra, saphida, malta etc.) throughout the year;
- 9.1.7 Establish market connectivity through the formation of farmer co-operatives for marketing of processed products;
- 9.1.8 Undertake special programs by providing incentives for the promotion of profitable crops (Aus /Maize);
- 9.1.9 Reduce crop loss due to storm and tidal surge and increasing the income of the farmers through cultivation of and acquisition of juice from gardener plants; and
- 9.1.10 Create awareness and alert, by providing agrometeorological information through monitoring tidal movement, soil and water salinity.

9.2 Haor and Wetland Agriculture

Boro rice cultivated in low lying areas in haor often gets drowned due to early/sudden floods. Besides, due to lack of proper communication system in these areas, providing timely agricultural inputs and extension services are hampered in many places. Initiatives will be taken to adopt and implement the agricultural activities of the following special methods for protection of crops in these areas:

- 9.2.1 Reduce the loss of crop by introducing rice seed production in the floating method and increasing the early maturing rice cultivation and gradually discouraging the cultivating of the late maturing crops;
- 9.2.2 In addition to the development of demanding technology, small programs will be undertaken based on suitable areas;
- 9.2.3 Strengthen the modern technology-based training and extension⁹ for area-based sustainable agricultural management;
- 9.2.4 Expedite extension activities to popularize flood and submergence tolerant crops;
- 9.2.5 Construct crop protection dams in the event of sudden flood and promote advance disaster forecast through community radio; and
- 9.2.6 Increase the income of the farmers by introducing grass and vegetable cultivation in the floating system.

9.3 Hill Agriculture:

Although jhum cultivation is the age-old practice in the hill areas, modern agricultural cultivation has been introduced in the area. Nowadays cultivation of mango, litchi, pineapple, lime and local varieties of Bangla banana and jackfruit are widely being cultivated. The size of an agricultural blocks in the hill areas is huge and communication system is inaccessible. Houses of people living in the blocks are also scattered. Because of the difficulties of providing extension services in hilly areas, due to laborious and time-consuming conditions, the following special methods/activities will be followed:

- 9.3.1 Strengthen modern varieties and technology development programs suitable for environment-friendly jhum cultivation;
- 9.3.2 Facilitate extension services by reducing the size of the block and increasing the number of extension workers;
- 9.3.3 Make extension services meaningful by including headmen and public representatives in the concerned block/ward;
- 9.3.4 Provide training for making saplings/grafts in a better way to cultivate fruits/vegetables and encourage nursery owners for increasing knowledge, skills, employment generation and income;

- 9.3.5 Make arrangement for making water available by conserving water from hill springs for irrigation and homestead use;
- 9.3.6 Encourage irrigation activities through the use of other modern and sustainable technologies including drip/sprinkler irrigation system;
- 9.3.7 Set up market access facilities and establish archive to ensure fair prices of hilly popular fruits and bini rice;
- 9.3.8 Encourage cultivation of suitable crops in the hill slopes to prevent erosion and decay of the land; and
- 9.3.9 Establish fruit gardens/forests in the fallow land for increasing employment generation and income.

9.4 Barind Agriculture:

The agricultural system of Barind region is rain-dependent, the soil is relatively barren and has less water storage capacity. For these reasons, rice cultivation becomes susceptible to drought, the yield decreases severely and the subsequent rabi crop becomes uncertain. The following steps will be taken to increase the agricultural production of this area:

- 9.4.1 Encourage the farmers to face the drought by producing deep rooted, drought tolerant and short water demanding crops;
- 9.4.2 Increase the soil water efficiency and fertility by applying lime, organic fertilizer and introducing green manuring;
- 9.4.3 Encourage conservation and use of rain water in the mini-pond or other containers in Upper Barind region;
- 9.4.4 Encourage cultivation of thornless creepers with maize as a mixed crop for improving soil fertility and weed control; and
- 9.4.5 Considering the problem of water crisis, establishment of deep tube wells should be discouraged and encourage cultivation of Rabi crops instead of Boro paddy as far as possible.

9.5 Charlands Agriculture:

- 9.5.1 Conduct surveys on the area of charland, fertility of the land and identification of areas suitable for agricultural production.
- 9.5.2 Provide development and extension services through the sandbar cropping and river bed crop farming system;
- 9.5.3 Encourage the use of balanced quantities of fertilizers as per the requirement of existing cropping line in char area;
- 9.5.4 Encourage farmers to cultivate crops suitable for less fertile land;
- 9.5.5 Increase productivity, encourage the farmers to cultivate organic fertilizers and nitrogen fixing crops;
- 9.5.6 Provide special agricultural support and market linkage for encouraging crop production in charlands.

9.6 Natural Disasters and Agricultural Rehabilitation:

9.6.1 Floods:

- 9.6.1.1 Encourage farmers to follow cultivation of short duration and late variety crops and follow suitable, cultivate and expand the expedition and follow suitably post-harvest technology to face the possible loss due to sudden /early and late flood:
- 9.6.1.2 Take measures to ensure emergency extension services and timely care for the satisfactory production of the planted crops;
- 9.6.1.3 Take measures for cultivation of mixed and relay crops and put emphasis for cultivation of Rabi crops; and
- 9.6.1.4 Reduce crop damage and ensure sustainable production system by predicting occurrence of floods and subsequent production support.

9.6.2 Extreme Temperature:

- 9.6.2.1 Strengthen the cultivation of cold-tolerant Boro rice varieties by using suitable seedlings with Kushi and Kaich-Thore;
- 9.6.2.2 Strengthen the development and dissemination of high temperature-intensive wheat and Aus paddy varieties; and
- 9.6.2.3 Undertake measures for development of suitable production technology suitable for extreme hot and cold conditions.

9.7 Cyclones and Tidal Wave:

- 9.7.1 Initiate steps to reduce crop loss by changing planting time and expansion of useful technology; and
- 9.7.2 Provide loans, training and incentives to farmers to recover from disaster related shocks.

9.8 Drought:

- 9.8.1 Encourage the practice of rain water harvest and provide supplementary irrigation by digging ponds, streams and canals;
- 9.8.2 Take steps for the expansion of technology to combat drought by providing training;
- 9.8.3 Increase the income of the farmers by expanding the cultivation of high value crops; and
- 9.8.4 Encourage farmers to identify and produce drought tolerant varieties.

9.9 Thunderstorms:

- 9.9.1 Strengthen plantation of thunderbolt trees, along with palm, high rise trees for saving human lives and crops:
- 9.9.2 Take initiatives for mitigation of risk through advancement of agriculture and afforestation in thunder-prone areas.

9.10 Waterlogging and Salinity:

- 9.10.1 Encourage farmers in the management of suitable cultivation with production and identification of varieties with tolerance against waterlogging and salinity ;
- 9.10.2 Encourage farmers to cultivate poultry/fish with crops for increasing the total income of the family; and
- 9.10.3 Increase the capacities of farmers by providing training related to water-based adaptive technology.

10. Specialized Agriculture

Vegetable and fruit production is being practiced in spaces without soil due to shortage of agricultural land, natural disasters, livelihood demand, hobbies and nutritional needs. The floating agriculture in the southern part of the country has already been recognized internationally by the United Nations (Globally Important Agricultural Heritage System) which can be marketed as an organic product through branding. In this regard, the following steps will be taken to ensure sustainable production technology, including suitable varieties:

10.1 Rooftop Agriculture:

- 10.1.1 Provide necessary training/encouragement and increase awareness about rooftop agriculture:
- 10.1.2 Strengthen rooftop farming technologies and strengthen extension programs by involving government and private sectors: and
- 10.1.3 Include rooftop agriculture in the mainstream agriculture and provide assistance for its commercialization.

10.2 Hydroponic and Aero-phonic Agriculture:

- 10.2.1 Undertake special initiatives for the development and dissemination of nutritional value and productivity enhancement through Hydroponic culture technology for cultivation of fruits and vegetables;

- 10.2.2 Provide product support, training and incentives to increase the interest and efficiency of Hydroponic agricultural production; and
- 10.2.3 Encourage the sustainable expansion of the aeroponic agricultural technologies through examination of its technical feasibility.

10.3 Cultivation of Mushroom and Other High Value Crops:

- 10.3.1 Encourage the selection of beneficial and potential species of mushrooms and other high value species and select their advanced lines;
- 10.3.2 Undertake necessary development programs for innovation and expansion of sustainable technologies for cultivation of mushroom, asparagus, minimaize and other high value crops;
- 10.3.3 Undertake initiatives to create entrepreneurs, especially women entrepreneurs in producing and supplying mushroom spawn; and
- 10.3.4 Encourage private sector by providing training and production support for commercial production of mushroom.

10.4 Controlled Agriculture:

- 10.4.1 Identify crop and area based protective agricultural activities, encouraging and strengthen protective agricultural development according to local and international demand and increase institutional competence;
- 10.4.2 Take effective steps to encourage production and import of essential greenhouse, glass house and growing chamber etc. for regulated agricultural development and take measures for rebate of taxes and prevention of pollution.
- 10.4.3 Encourage the production of seedlings and crops in the field of agricultural management for reducing risk and provide necessary support for the production and import of the raw materials.

10.5 Conservation Agriculture:

- 10.5.1 Strengthen the efficiency and effectiveness of conservation agriculture (cost, energy and labor saving) and strengthen the efficiency of use of the necessary equipment and increase the efficiency and competence of the related institutions;
- 10.5.2 Enhance development activities by identifying profitable crops and agricultural activities; and
- 10.5.3 Take special efforts to increase the training/awareness in the development and extension of sustainable protective agricultural development.

10.6 Marine Agriculture:

- 10.6.1 Identify the floating Plankton organisms for the use as food of the livestock and aquatic animals and also use in pharmaceutical industries; and to undertake research activities for its safe and regulated production and use;
- 10.6.2 Select the areas for the cultivation of sea weed develop its of varieties, the post harvesting techniques and undertake program to increase its production;
- 10.6.3 Enhance capacity of concerned organizations to strengthen research on sea weed cultivation;
- 10.6.4 Strengthen the local and export market connectivity and promote the cultivation of sea weed by providing incentives to private/individual entrepreneurs.

10.7 Floating Agriculture:

- 10.7.1 Verify the feasibility of floating farm based crops and to modernize the production system and to undertake branding initiatives for marketing as a heritage product;
- 10.7.2 Undertake short, medium and long-term programs involving motivated participants to expand region-based needs and appropriate adaptive technologies; and
- 10.7.3 Take initiatives to integrate floating agriculture with the mainstream agricultural activities as a coordinated means of risk management in agriculture.

10.8 Sorjan Farming Method:

- 10.8.1 Take steps to increase the production of vegetables, rice and fish in Sorjan method in the waterlogged and tide prone areas;
- 10.8.2 Strengthen the process of evaluation of the existing Sorjan method and take steps to increase productivity;
- 10.8.3 Take initiatives to provide training on the importance, technique and production technology to private and individual entrepreneurs.

10.9 Precision Agriculture:

- 10.9.1 Take measures to create manpower for developing innovative machineries, and provide tax rebate for imported machineries and inputs suitable for specific areas with soil fertility and soil moistures; and
- 10.9.2 Take initiatives to select crops and develop production technologies for precision agriculture`.

11. Production of Safe Food and Agricultural Produces:

It is possible to ensure safe food production by following proper follow-up of Good Agricultural Practices (GAP). In order to ensure public health, the following steps will be taken to produce safe food:

11.1 Capacity Development:

- 11.1.1 Formation of Standardization and GAP Authority for the introduction of good agricultural systems;
- 11.1.2 Ensure safe levels of pesticide use in the crops and to take action against foodborne diseases in order to prevent bacterial infection; and
- 11.1.3 Take attempts to create awareness, marketing, motivation and creation of efficient manpower for increasing awareness, safe and nutritious food production.

11.2 Development, Awareness and Training:

- 11.2.1 Take initiatives to establish GAP branding and GAP regions for different crops;
- 11.2.2 Strengthen monitoring of adulterated and poor pesticide sales, use and control;
- 11.2.3 Develop simple and cost effective methods for measuring the residues of chemicals and pesticides applied to fruits and vegetables;
- 11.2.4 Undertake initiatives to introduce/implement good practices and certification programs;
- 11.2.5 Initiate efforts to increase the awareness about insecticides, crops/vegetables/nutrients;
- 11.2.6 Ensure safe food production through new pest management and safe pesticide development and training of partners;
- 11.2.7 Take initiative for the collection, post-harvest management, handling, preservation and processing of health-related agricultural products according to Safe Food Act-2013; and
- 11.2.8 Discourage production and marketing of crops having possibility of health risk.

12. Agricultural Marketing

Effective and efficient marketing system makes products available to consumers at a faster rate and plays an important role in overall economic development. The importance of agricultural marketing is immense in increasing production, ensuring product quality, and ensuring fair prices. The following steps will be taken to ensure fair price of products to producers, affordable price to consumers and make agriculture a profitable venture.

12.1 Development of Agricultural Marketing Infrastructure:

12.1.1 Agricultural Industry and Export:

- 12.1.1.1 Create a sustainable supply chain through development of market infrastructures;
- 12.1.1.2 Encourage both public and private sector for promotion of agricultural products and markets;
- 12.1.1.3 Add value to agricultural product and highlight the importance of value chain for the purpose of proper market management;
- 12.1.1.4 Encourage establishment of modern facilities, including packaging and other facilities at the public and private level, to increase safety, keeping quality and freshness of agricultural products;
- 12.1.1.5 Encourage the initiative of digitization of marketing of agricultural products;
- 12.1.1.6 Encourage Public-Private Partnership (PPP) investment for export and set up laboratory and testing center with the necessary facilities for quality testing and standardization of agricultural products; and
- 12.1.1.7 Take measures to reduce post harvest losses by using modern technology in transport and marketing system.

12.1.2 Market Information Collection and Broadcasting Services:

- 12.1.2.1 Collect and disseminate market related information at wholesale and retail levels to producers, businessmen, entrepreneurs and consumers;
- 12.1.2.2 Encourage expansion of delivery of services to farmers and entrepreneurs for value added agricultural produce;
- 12.1.2.3 Increase broadcasting services to popularize packaging/grading/labeling activities; and
- 12.1.2.4 Initiate the process of possible announcement of price based on the demand and supply of agricultural products.

12.2 Agricultural Product Processing and Expansion of Industries:

- 12.2.1 Encourage the establishment of primary agriculture based industries;
- 12.2.2 Take measures to **increase the income of the farmers** by encouraging establishment of small industries by using by-products such as straw / husk, hay, jute leaf, jute stick, etc.; and
- 12.2.3 Provide technological and technical support to business and entrepreneurs for processing agricultural produce.

12.3 Commercial Agriculture:

- 12.3.1 Provide special extension services and assistance to the contractual manufacturing system for the sake of commercial agriculture;
- 12.3.2 Undertake initiatives for the promotion of commercial agriculture through the creation of profitable agricultural produce and creation of producer consumer communications; and
- 12.3.3 Encourage the farmers by providing incentives to attract commercial agriculture.

12.4 Production of Exportable Goods:

- 12.4.1 Undertake necessary initiatives for the production and marketing of exportable agricultural commodities; and
- 12.4.2 Encourage production of exportable goods through good agricultural practices, organic farming and grading.

12.5 Market Development:

- 12.5.1 Explore the potentials new markets in Bangladeshi populated areas overseas and increase diversity of exportable products;
- 12.5.2 Take initiative to expand domestic and international markets of environment friendly agriculture/organic farming based products;
- 12.5.3 Increase demand for products in the international market by strengthening the coordination between government/non-government organizations;
- 12.5.4 Assist in the development/use of e-infrastructure in the export market development, communication and distribution;
- 12.5.5 Encourage public and private partnerships and coordination for effective market management;
- 12.5.6 Provide technical support for the initiation of agricultural and commercial activities to individual entrepreneurs and producers;
- 12.5.7 Initiate the activities of increasing trade opportunities in the national and international markets by providing incentives;
- 12.5.8 Adopt grain warehouse loan program to ensure fair prices of agricultural commodities; and
- 12.5.9 Provide support for the establishment of local/export market connectivity of handicrafts by using agricultural produce.

13. Women Empowerment

Participation of women in direct and indirect ways in the agricultural sector is universally recognized. The main objective of women's participation in agriculture is to make women as skilled human resources. The following activities will be taken for the development of women's involvement in the agriculture sector to prevent heavy influx of people to urban areas:

- 13.1 Provide technical support to women on priority basis through training on family nutrition security, crop production, post harvest activities, agricultural business and industrial activities;
- 13.2 Encourage women's contribution in the field of agriculture, especially for the production of vegetables, drying and storage, etc. and encouraging the use of women's labor in exchange of cash wage;
- 13.3 Adopt separate extension programs for women farmers in crop production activities in the light of agricultural extension policies;
- 13.4 Ensure participation of women in planning, decision making, supervision in activities related to attainment of food security;
- 13.5 Assure and evaluate the labor, role, contribution, and recognition of women in the context of social dignity and security;
- 13.6 Initiate measures to eliminate wages inequality of women workers in agriculture and to ensure gender equality;
- 13.7 Take initiative to further strengthen women's position in economic activities by providing encouragement in the establishment of agricultural product-based cottage industries; and
- 13.8 Encourage women in agricultural education, research, extension and training.

14. Youth in Agriculture

Future agriculture will be managed by an educated, conscious, knowledgeable, patriotic and energetic youth. Youths need to become partners in all development activities by establishing youth farming clubs, and encouraging them to establish small and medium agricultural enterprises. The following activities will be undertaken in agro-based economic activities because of their prospect of involvement in agricultural growth:

- 14.1 Encourage the active participation of the youth in agriculture through the establishment of 'Youth Farmer Club';
- 14.2 Create opportunities for self-employment of the youth by promoting high yielding and high value crops and setting up small and medium agricultural industries;
- 14.3 Encourage youths to be involved in agricultural work through encouragement to invest in agriculture, providing easy loan assistance and incentives;
- 14.4 Develop youths as successful agricultural entrepreneur by increasing their training, awareness and efficiency;
- 14.5 Take initiatives to attract educated youth to stay in agriculture by reducing physical labor through agricultural mechanization;

- 14.6 Create self-employment opportunities for the youth by applying value addition techniques /methods in production of crops; and
- 14.7 Take initiatives to involve the youth in agriculture related activities such as establishing agricultural inputs marketing, processing industries, fish farming, and animal husbandry.

15. Investment in Agriculture

Agriculture will be turned into a dynamic sector through necessary investment in infrastructure development, research and development, extension, adoption and implementation of development projects, provision of modern agricultural machinery, skilled manpower, development assistance, agricultural rehabilitation etc. In addition to extended budget allocation in the research sector, agricultural research endowment fund has been set up to encourage participation of public and private research institutions and universities in agricultural research and development. The following initiatives will be taken for direct investment in human development, poverty alleviation and improvement of life in rural areas:

15.1 Research Infrastructure and Human Resources Development:

- 15.1.1 Allocate adequate funds for the development of technology through research, by increasing institutional capacity with modern facilities, knowledge and skills;
- 15.1.2 Allocate more funds for irrigation, drainage, marketing and market infrastructures and farm mechanization;
- 15.1.3 Create skilled human resources especially through investment in high and specialized education;
- 15.1.4 Allocate funds for training at both national and international levels for the acquisition of skills in the field of agriculture;
- 15.1.5 Enhance investment in the development of stress tolerant and nutrition-rich varieties / technologies, through a comprehensive range of research on biotechnology;
- 15.1.6 Undertake initiatives for setting up and developing agro climatic and weather forecasting centers;
- 15.1.7 Take initiatives to develop the educated unemployed as entrepreneurs through training and loan assistance;
- 15.1.8 Increase the allocation of funds for the establishment of Upazila based agricultural technology exhibition farm/horticulture centers;
- 15.1.9 Take initiative to improve the capacity of government organizations including seed certification agencies to meet the growing seed demand; and
- 15.1.10 Promote private investment in the production of agricultural produce, developing cold storage and food processing infrastructure and enhance export of flowers/fruits/vegetables.

15.2 Agri-industry and Employment Generation:

- 15.2.1 Provide assistance for bulk purchase of seeds agrochemical, establishment of agricultural industries, and purchase of cooling vans;
- 15.2.2 Provide incentives for farm mechanization, profitable crop cultivation, bee keeping, preparing organic fertilizer and vermicompost; and
- 15.2.3 Take initiative for establishment of agricultural tourism for attracting domestic and foreign tourist and thereby increasing income.

15.3 Incentives, Agricultural Rehabilitation and Market Development:

- 15.3.1 Increase the productivity of crops, improve post harvest technology, sustainable natural resource management and provide financial assistance or loan for development for the above activities;
- 15.3.2 Undertake special efforts to provide loans, production and price support to the marginal and poor farmers;
- 15.3.3 Take measures to allocate money for production support and agricultural rehabilitation to the poor and marginal farmers;
- 15.3.4 Take initiatives to establish market links to ensure fair prices of agricultural products;
- 15.3.5 Strengthen agricultural rehabilitation programs for farmers' compensation in natural disasters;
- 15.3.6 Encourage private investment for increasing agricultural production, marketing and improved supply of agricultural inputs;
- 15.3.7 Undertake initiatives to promote the production and export of healthy, safe products and provide assistance for development of export market;
- 15.3.8 Encourage private investment in overseas agricultural trade, keeping the national interest in mind; and
- 15.3.9 Take initiatives for integrated planning at national, regional and district levels, as well as investment in prioritized sectors for agricultural development.

16. Agricultural Cooperatives

Cooperatives play an important role in employment generation, poverty alleviation and socio-economic development. There are scopes to introduce cooperative activities in the crops sub-sector as well as in fish, dairy, housing, microfinance and service sector. Co-operative societies in the name of Common Interest Group, Water Management Group etc. are involved in various income oriented activities in the country. Such cooperatives will be able to bring prosperity to the agricultural sector with training and credit support. The following steps will be taken to promote cooperatives in agriculture:

- 16.1 Encourage formation of self-motivated co-operative or group based agricultural production by involving marginal farmers, small producers and entrepreneurs, keeping their ownership of the land;

- 16.2 Provide extension services for cooperative production, use of agricultural machinery, especially agricultural equipment, loans and development assistance;
- 16.3 Prioritize cooperative initiatives in the production of profitable crop, irrigation and farm mechanization;
- 16.4 Encourage and promote cooperative marketing to ensure fair prices of agricultural commodities;
- 16.5 Provide incentives to participate in project management, maintenance activities, effective water management, income generation, extension services, collection of materials and obtaining loans;
- 16.6 Take initiative to increase the participation of women in the production, preservation and marketing of agricultural produce through cooperatives;
- 16.7 Take initiatives to pull the fallow and uncultivated lands of the absentee land owners under cooperative cultivation system and arrange for distribution of earnings from the crops to land owners, agricultural laborers and cooperative societies through a rationalized distribution arrangement.

17. Information and Communication Technology

With the use of information and communication technology for rapid expansion of the new technologies on a larger scale, agriculture sector will be enriched. Being open, effective and time-saving for all, extension services can be easily reached with innovative technologies in backward and remote areas. In the future, the following steps will be taken to utilize the existing and modern services for development of Smart Farmers and Digital Agriculture.

- 17.1 Take attempts to establish necessary agricultural information services and community radio facilities in the risk areas to increase crop production;
- 17.2 Use Bangabandhu Satellite-1, GIS and Remote Sensing Techniques for collecting crop and environment related information;
- 17.3 Encourage broadcast of agricultural programs on a daily basis in the TV channel;
- 17.4 Adopt quality agricultural services by encouraging contact with agricultural call centers;
- 17.5 Transform the Union Digital Center (UDC) into Agriculture Information and Communication Center and improve on line based e-farming services to facilitate agricultural and agri-based services;
- 17.6 Take steps to promote the activities of crop varieties, production technology, nutrition security, adverse weather, disease management, crop preservation and processing;
- 17.7 Encourage the farmers to strengthen and use digital service activities such as internet, online, offline, mobile apps, web portal, facebook pages etc.;

- 17.8 Take measures for the publication of agriculture based daily/weekly magazines (including online editions);
- 17.9 Undertake initiatives to create database of all farmers and provide digital ID card; and
- 17.10 Provide information technology services to improve the manpower and institutional skills of all related agricultural institutions.

18. Labour in Agricultural Sector

There has been a rising trend in the use of capital-intensive technology including agricultural mechanization. As a result, the use of labor force in agriculture is gradually declining and is being transferred to industry and service sectors. It is very important to take proper steps for giving better recognition and status to the existing labor force in the interest of retaining the labour force in agriculture. For efficient use of agricultural technology, it is necessary to develop knowledge and skills by providing timely training to the workers of this sector. The following steps will be taken to make people interested in making investment in agricultural labour force.

18.1 Enthusiasm:

- 18.1.1 Take necessary measures to give recognition and status to agricultural labour;
- 18.1.2 Undertake activities to create year round jobs for agricultural workers by increasing cropping intensity and diversification;
- 18.1.3 Encourage agricultural workers for the establishment of area based clubs and take services on group basis;
- 18.1.4 Undertake measures for educational tour of farmers at local/regional /international levels encourage them to acquire more knowledge and experience in the field of agriculture.

18.2 Workers' Welfare:

- 18.2.1 Reduce risk in agricultural work (eg, to apply pesticides and to run heavy, sharp and propelling agricultural machinery);
- 18.2.2 Encourage people to take adequate precautions in performing risky agricultural activities;
- 18.2.3 Take initiatives to include agricultural workers' welfare in the development programs; and
- 18.2.4 Take initiatives for formation of clubs, formulation of rules for running the clubs, creation of welfare funds, and distribution of credit to the poor and less privileged farmers.

19. Coordination and Cooperation

To face the multi-dimensional challenges of agricultural development, one of the main goals of the present government is to achieve sustainable agricultural development by integrating efforts of government, non-government, international bodies and private individuals. It is possible to limit the emergency disasters to tolerable levels by ensuring adequate technical, and financial support through disaster preparedness and rehabilitation activities. In this case, the following steps will be taken in collaboration with national, international and donor agencies:

19.1 Strategic Stages:

- 19.1.1 Take steps to implement agricultural production and rehabilitation program jointly by all government and non-government organizations, including the ministries and agencies controlling supply of agricultural inputs;
- 19.1.2 Adopt a comprehensive plan for the development of drainage and irrigation to improve the use of water resources and reduce water logging to increase agricultural production;
- 19.1.3 In case of disaster, take initiative to control agricultural situation through the formation of national committee if necessary.

19.2 Implementation Stage:

- 19.2.1 Make collective efforts by all government organizations involved in agricultural research, extension, marketing and agricultural production management, including maintenance of sustainable agricultural production;
- 19.2.2 Establish effective and intensive communication among the NARS institutions, the Department of Agricultural Extension and the interested private/donor agencies for identification of ground level problems and their solutions; and
- 19.2.3 All government organizations would work together to provide market-based services to ensure fair prices of agricultural commodities.

19.3 Public and Private Cooperation:

- 19.3.1 Encourage that the government organizations to conduct research, extension, supply of equipment, marketing, and product quality strengthening activities jointly with interested private sector organizations; and
- 19.3.2 Accelerate the expansion of the variety technology by organizing training and exchange of opinion.

19.4 Regional and International Cooperation:

- 19.4.1 Encourage the work of NARS organizations intensively with the works of the International Agricultural Research Centers;
- 19.4.2 Coordinate implementation and monitoring of research supported by international agencies by the BARC;

- 19.4.3 Enhance government initiatives to increase regional co-operation in the activities of innovation and technology;
- 19.4.4 Strengthen the participation of domestic institutions in international research and emphasize the inclusion of local priority issues in international collaborative research;
- 19.4.5 Take initiatives in the field of innovation dissemination of technologies and sharing of experience at international/regional levels; and
- 19.4.6 Encourage initiatives taken by developed/developing countries and international/regional organizations for the development of species of plant resources and exchange of modern knowledge and skills.

19.5 Partnerships:

- 19.5.1 Encourage establishment of strategic partnership with Human Resource Development Organizations of developed and developing countries in the field of knowledge and technology for enriching the knowledge of agriculture;
- 19.5.2 Establish strong connection through exchange of ideas with national and international organizations.

20. Miscellaneous Issues

All the people involved in productive agricultural development need to be encouraged and rewarded in various ways. Attention also needs to be given to self-employment generation and other elements of profitable farming. Because of the importance of local knowledge and market value of natural resources and their economic importance, it is important to put emphasis on the production and marketing of crops to increase income. It is also important to develop innovative skills, the institutional arrangement for encouraging the people in this regard. In the overall consideration, in order to keep a dynamic agricultural system in place, the following steps will be taken:

20.1 Preservation of Intellectual Property:

- 20.1.1 Cooperate and encourage the establishment of intellectual property at the national and international level in the field of technology and knowledge innovation; and
- 20.1.2 Undertake program to protect intellectual property right by providing incentives and royalties for invented technology.

20.2 Geographical Indications (GI):

- 20.2.1 Take special actions to identify the geographical indicator crops, their selection and registration or presentation of processed products;

- 20.2.2 Take action to increase awareness about GI crops and provide training on their sustainable production; and
 - 20.2.3 Encourage all concerned for the increase in production marketing and take initiative for developing export market of the GI crops.
- 20.3 Non-agricultural Activities:**
- 20.3.1 Undertake programs aiming at creating employment opportunities by using agricultural products and by-products;
 - 20.3.2 Take measures to bring the rural population under regular training to create employment in non-agricultural sector; and
 - 20.3.3 Encourage further development initiatives by the development partner organizations to engage rural communities in the non-agricultural sector.

21. Preference for Bangla Language

With the starting of implementation of the ‘Jatiyoo Krisi Niti 2018’, in Bangla the government can publish a reliable translation of English version by official Gazette notification. In case of any confusion/incompatibility in the texts in Bangla and English, the text of the Bangla version will remain acceptable.

22. Conclusion

The recent agricultural development in Bangladesh is a unique example in the global context. After emergence as a food self-sufficient country from a food deficit one, activities are being directed to meet the needs of nutrition along with adequate food intake. Due to technology dependent farming, productivity of rice, vegetables, fruits, potato, jute etc. have increased. On the other hand, acceleration in the growth of food production for the growing population from declining availability of land, it has become necessary to formulate agriculture development plan in a new dimension. Especially, with the emerging increase in peoples’ income, the increase in diversity of food demand, value addition to food products, and overcoming the adverse effects of climate change have added new dimensions to the agricultural planning.

As a result of taking appropriate measures following the ‘National Agricultural Policy 2013’, the dream of the Father of the Nation of building a hunger free nation has been fulfilled. Due to the steady growth of the agricultural sector in the overall economy, it has been possible to achieve more than 7 percent growth in national income. The ‘National Agriculture Policy 2018’ has been formulated by taking timely measures for accelerating the agricultural growth by tackling the challenges of climate change.

This policy has emphasized the development of more advanced technology, based on crop management and increasing the income of the farmers by increasing the desired level of productivity and production. As a result of implementation of this policy, the capacity of the agriculture sector will be increased through agricultural productivity, food security, safe food, poverty alleviation and by tackling of the risk of global warming. All these measures will enhance the accomplishment of the cherished goal of the Father of the Nation Bangabandhu Sheikh Mujibur Rahman of building the Shonar Bangla. The agriculture sector will achieve a solid ground by making use of intellectual capacity of all, efficiency, and the balanced use of natural resources.