National Seed Policy-1993

Ministry of Agriculture

Section - 12

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Quality seed is considered to be the basic input for increasing agricultural output and thereby achieving self-sufficiency in food production. Effectiveness of other inputs like fertilizer and irrigation depends largely on good seed. But use of improved seed is still very limited. Two major reasons behind this fact are:

a) Production and distribution of quality seed is insufficient in the public sector as compared to its demand; and

b) Seed production in the private sector has not yet got the necessary support.

Development of facilities in public and private sectors for production of sufficient quantity of improved seed and for making them available to the farmers at appropriate time and at reasonable price has been suffering from lack of definite policy directives. At the same time potentiality of technical assistance could not be explored due to absence of a clear Govt. policy in this field. With a view to overcoming this critical situation the MOA has formulated a National Seed Policy for the country.

A committee, formed by the MOA, reviewed the seed policies of a number of neighboring countries and drafted a National Seed Policy drawing lessons and inputs from the experiences of countries having similar agro-ecological and socio-economic settings.

National Seed Policy provides for policy directives to increase production of improved seed both in the public and private sectors and for making best quality seeds available to the farmers on timely basis, and at competitive price. The seed policy has also provisions, among other things, for liberalization of import of seed and seed processing machineries, strengthening of quality control and research system and maintaining a seed security arrangement. A major thrust of the seed policy has been on the institutional arrangement of the seed sector.

National Seed Board (NSB) has approved the draft of the National Seed Policy.

The Seed Policy of Bangladesh

1. Objectives of the seed policy

1.1. Overall objectives

The overall purpose of this policy is to make the best quality seeds of improved varieties of crops conveniently and efficiently available to farmers with a view to increasing crop production, farmer's productivity, per capita farm income and export earnings.

1.2. Specific objectives

1) To breed, develop and maintain improved crop varieties with special emphasis on those suitable for high-input and high-output agriculture.

2) To multiply and distribute, on a timely basis, to all farmers sufficient quantities of quality seed of improved high yielding varieties that are resistant or tolerant to disease and insect pests.

3) To promote farmer's acceptance and use of improved varieties of seeds.

4) To promote, through education, training and financial supports, balanced development of public and private sector seed enterprise.

5) To simplify the importation, for research and commercial purposes, of high quality seeds and planting materials.

6) To promote seed technology by providing training and technical supports to agricultural specialists and professionals, farmers and workers, and private seed growers and merchants in seed production, processing, storage and use of high quality seed.

7) To monitor, control and regulate the quality and quantity of seeds produced as well as development and commercialisation of the seed industry.

2. Strategy for seed development

To achieve the above objectives, the following strategies among others, are to be followed:

2.1. To strengthen the institutional capability of the public and private sector entities engaged in the seed industry.

2.2. To evolve and/or adapt seed technology to meet the needs of high-input and high-output agriculture.

2.3. To promote balanced development of the seed sector by providing equitable opportunities to the public and private sector at all stages of the seed industry from breeding to marketing of seeds.

2.4. To simplify procedures for import of high quality seeds and planting materials, both by the public and private sectors to enable farmers to have access to the best quality planting materials available in the world.

2.5. To strengthen seed certification, quality control and testing facilities to ensure availability of quality seeds to farmers.

2.6. To simplify procedures for effective observance of plant quarantine.

3. Development and promotion of improved seed varieties

3.1. Variety development programmes should, as a matter of priority, be focused on generation of high-input and high-output technologies.

3.2. The NARS will continue to pursue plant breeding programs for all crops of national importance. However, special efforts will be made to evolve improved varieties for pulses, oil seeds, tuber crops, vegetables, fruits and spices.

3.3. Improved varieties of seeds and planting materials should be procured and introduced in the country by allowing their import, especially through private seed entrepreneurs. For this purpose, business contracts, including joint ventures, are to be encouraged between private enterprises and foreign seed companies.

3.4. Private persons, companies and other agencies will be encouraged to undertake plant breeding programs and will be allowed to import breeder/foundation seeds of notified crops for variety development and promotion purposes.

4. Approval and registration of varieties

4.1. New varieties of wheat, rice, jute, potato and sugarcane developed by private or public agencies will be subject to notification by the National Seed Board.

4.2. Varieties of all other corps developed by public research agencies will be subject to an internal review and approval by each respective agency and must be registered with National Seed Board before being released.

4.3. Varieties of crops, other than rice, wheat, jute, potato and sugarcane that are imported or locally developed by a private person, company or agency must be registered with the NSB giving prescribed cultivar descriptions, but will not be subject to any other restrictions.

4.4. In the event a variety of seed is found to be harmful or potentially harmful to the country’s agriculture, the NSB will prohibit the sale of that variety.

5. Variety release

The variety release and variety notification functions will be separated. The NSB shall notify varieties of seeds under the provisions of the Seeds Ordinance. The release of varieties of controlled crops such as rice, wheat, jute, potato and sugarcane or those added by NSB, shall vest in a Technical Committee headed by Executive Vice-Chairman, BARC and consisting of representatives from major research institutions (BARI, BRRI, BJRI, BSRI), SCA, DAE, BADC, private sector Seed Growers and Farmers Associations.

6. Maintenance breeding

Maintenance breeding and breeder seed multiplication is to be improved and strengthened at the NARS. For this purpose, required facilities, equipment, trained personnel, etc. shall be provided at the respective research centres and stations.

7. Seed multiplication

7.1. Breeder and foundation seed, of all varieties will be made available through negotiation to duly registered seed producers both in the private and public sectors.

7.2. BADC will concentrate primarily on producing foundation seeds of rice, wheat, jute, potato and sugarcane on its own farms.

7.3. BADC will use farmers to multiply seeds on a contract basis and will gradually cease to grow certified seed on its own seed farms.

8. Import of seeds

8.1. Except appropriate plant quarantine safeguards, restrictions on importation of seeds are to be eliminated. Approved varieties of rice, wheat, jute, potato and sugarcane may be imported for commercial sale. However, registered seed growers will be permitted to import small quantities of seeds of rice, wheat, jute, potato and sugarcane for adaptability testing.

8.2. The Plant Quarantine Regulations provided under the Destructive Insect and Pest Act 1966 (as amended upto 1989) are to be reviewed and reformed with a view to simplifying procedures to facilitate import of high quality seeds and planting materials. Plant quarantine procedures will be made applicable to crop/plant species and not to specific varieties.

9. Seed regulations

9.1. Controlled crops

The NSB shall designate kinds and varieties of crops that are to be notified. Initially, rice, wheat, jute, potato and sugarcane will be the only notified crops. Release of the varieties of notified crops will be subject to evaluation and testing by the Technical Committee on seeds. Varieties of all other crops will have to be registered prior to being sold, but there will be no requirement for prior testing and approval.

9.2. Registration of varieties

Any variety, whether imported or developed in Bangladesh, must be registered with the National Seed Board. The registration will require the characteristics and attributes of the variety to be described. Registration will be a relatively easy process designed to facilitate legitimate identification. Except for controlled or notified crops, registration will not involve testing or any other procedure.

9.3. Registration of seed dealers

Any individual, company or agency that wishes to import seed, develop and register new seed varieties, or package seed in labelled containers must first be registered with the National Seed Board. Registration will be automatic by paying the prescribed fees.

9.4. Labelling of seeds

Anyone packaging seed in labelled containers must do so in accordance with requirements prescribed under the Seed Rules. The labelling requirements will specify variety of crops, lot number or batch identification, net weight or count, minimum germination percentage, physical purity, name and address of the company packaging the seed and the date of packaging.

9.5. Seed certification

Seed certification will be a service provided to private individuals, companies or public agencies who wish to assure their farmer-customers that their seeds are of high quality. Although seed certification will be voluntary, public sector breeder/foundation seeds will be certified as a matter of policy.

9.6. Seed quality control

Seed quality will be ensured by requiring seeds in labelled containers/packages to meet the standards specified on the level. Seed dealers

who develop a good reputation will be protected by making it illegal for anyone to sell seeds in a labelled container that copies the name or trademark of any registered seed dealer.

10. **Seed security**

BADC and NARS will be required to maintain small stocks of improved varieties of rice, wheat and jute seeds so that when natural disasters occur, and seed supplies in an area are lost, seed of superior quality will be available for distribution. The amount of seed to be stored will be subject to further assessment and budgetary considerations.

11. Strengthening institutional capability of the seed sector

11.1. Strengthening NSB

11.1.1. The NSB will be strengthened through necessary amendments in the Seed Laws to establish it as the highest authority for policy making and planning for development of the national seeds system.

11.1.2. Reorganization of NSB

The NSB will be reconstituted as follows to ensure representation of all concerned with the development of the seed industry:

1.	Secretary, MOA	Chairman
2.	Vice-Chairman, BARC	Member
3.	Heads of National Research Institutions (BARI, BRRI, BJRI, BAU, BSRI, BINA, Cotton Board)	Member (7)
4.	Director General, DAE	Member
5.	Chairman, BADC	Member
6.	Member Director (Seeds), BADC	Member
7.	Representative of Seed Growers Association	Member
8.	Representative of Seed Merchants Association	Member
9.	Director, Seed Certification Agency	Member
10.	Director, Plant Protection Wing, DAE	Member
11.	Representative of Ministry of Finance	Member
12.	Representative of Farmer's Association	Member
13.	Director General (Seed), MOA	Member-Secretary

11.1.3. Creating a Seed Wing in the Ministry of Agriculture

A Seed Wing will be created in the Ministry of Agriculture, primarily to serve as a Secretariat for the NSB, and to perform among others, the following functions:

1) To help update policies and plan strategies for the development of the seed industry with special attention given to promoting private sector seed enterprises and to ensure implementation of such policies and strategies;

2) To monitor development and commercialization of the seed sector;

3) To oversee and co-ordinate the production of breeder and foundation seeds by public and private seed enterprises to meet farmer's demands;

4) To promote human resource development in the seed sector through training, seminars and workshops;

5) To develop a permanent cadre of trained and experienced seed technologists in public sector institutes to ensure sustained growth of the seed industry;

6) To plan and promote seed technology research in the NARS, BAU and the private sector;

7) To plan and implement a seed security system including maintenance of buffer stocks of seeds.

11.2. Strengthening of BADC-Seed Wing

11.2.1. Reorganization of the Seed Wing

(a) The Seed Wing is to run on a commercial basis as far as possible and be given control over the planning and financing of its operation.

(b) The Seed Wing will be reorganized to include such as Seed Production Division, Seed Conditioning, Processing and Storage Division, Seed Marketing Division with an internal quality control system, and an Administration Division.

11.2.2. Roles and functions

The role and function of the Seed Wing should include, among others, the following:

(a) Foundation seed production of all publicly developed varieties of controlled crops.

(b) Production of other kinds of seeds on a "level playing field" in competition with the private sector. BADC should gradually withdraw from production of those kinds of seeds undertaken by the private sector.

(c) The Seed Wing should provide technical assistance and other support/services to promote the development of a private sector seed industry.

11.2.3. Seed pricing and subsidies

BADC's seed prices should reflect costs more closely and subsidies should be phased out gradually.

11.2.4. Resources and facilities

BADC's seed multiplication farms will be turned to other uses except those most suitable for foundation seed production. All production beyond the foundation seed class, and including foundation seed class if possible, will be done by contract growers. Excess facilities, especially those of smaller scale, will be made available on a lease basis to the private sector for growing seeds.

11.2.5. Marketing

The seed sale centres at the Upazila level will be phased out and replaced with a network of seed dealers. The regional and transit seed centres will be designated and developed as 'lifting sites' for private sector dealers.

11.2.6. Reserve seeds stocks

The Seed Wing will be given management and operational responsibility for seed security stocks with budget allocation for this purpose.

11.2.7. Local/improved/popular varieties

The BADC-Seed Wing will be authorized to purify and maintain local varieties for which there is substantial and steady demand. Purification and maintenance will be done on the seed farms.

11.2.8. BADC's role will be reoriented to promote development of the private sector seed industry by:

(a) advising and training private seed producers to produce, process, store and market quality seeds;

(b) advise private seed entrepreneurs to manage and finance their seed companies;

(c) custom process, test and store, if convenient, seed of private entrepreneurs at BADC's facilities;

(d) negotiate with private sector seed enterprises for potential take-over of BADC's Contract Growers Scheme;

(e) providing seed-testing facilities to private seed entrepreneurs.

11.3. Support for seed businesses

11.3.1. The business of seed breeding, multiplication, production, processing, import & marketing should be declared as an agro-based industry under the Industrial Investment Schedule to make such companies eligible for various incentives, supports and concessions.

11.3.2. Individuals, companies or agencies engaged in the seed business should be allowed easy access to institutional credit at preferential rates of interest.

11.3.3. Foreign exchange

Importers of seeds and seed processing equipment will be made eligible for allotment of foreign exchange. Seed merchants will be allowed to enter into supplier's credit arrangements with foreign seed suppliers.

11.3.4. Access to facilities and equipment

Private sector seedsmen will be granted access to storage space, drying floors, dryers, cleaning equipment and related equipment and facilities that are in excess of BADC-Seed Wing needs. Access will be through custom services, lease, or lease-purchase arrangements.

11.3.5. Technical assistance and services

Technical assistance, training and services from BADC-Seed Wing, DAE, Research Institutes, NSTL, SCA and other public sector units involved in the seed industry will be made available to private sector seedsmen on request for a reasonable fee in connection with services such as seed testing, certification and inspection. The private sector will be granted access to or included in all donor assisted and organized seed related training courses, workshops and study tours. In cases where expert technical assistance is brought into Bangladesh under donor financed seed related projects, the technical assistance and services will also be made available to the private sector. The Bangladesh Seed Merchants Association and the Bangladesh Seed Producers Association will be used as a mechanism for communicating with the private sector.

11.3.6. Private sector representation in seed policy making

The private sector will be allowed representation in the National Seed Board, Variety Release Committee, and in any special committee constituted for or in the interest of seed production in Bangladesh.

11.3.7. Concessions and incentives

Favourable policies, incentives and support will be provided to promote private sector participation in the seed industry.

11.4. Strengthening of the Seed Certification Agency (SCA)

To facilitate implementation of the new Seed Policy, the role of SCA will be expanded beyond seed certification to include seed quality control and testing and enforcement of seed regulations. For this purpose the SCA will be strengthened by provision of expanded infrastructure and laboratory facilities, increased number of trained seed technologists and gradual development of a seed sub-cadre. The expanded role of SCA will be to:

1) advise seed producers on production, processing and quality control of seeds;
2) carry out post-market quality control through inspection, testing;
3) collect data/information on seed production, processing and quality control for use by the NSB;
4) certify all breeder and foundation seed of controlled crops;
5) certify seeds for seed enterprises as a service, if resources permit;
6) co-ordinate the variety evaluation and release mechanism for notified crops;
7) advise NSB on the denotification of varieties for reasons of poor performance of disease and pest susceptibility;
8) help DAE in the promotion and use of improved seed of HYV's among farmers;
9) collect samples of truthfully labelled seeds (TLS) throughout the country and check their declared standards through appropriate tests.

11.5. National Agriculture Research System (NARS)

Varietal development by NARS should anticipate the increase in irrigated high-input, high-output cropping systems and adapt their crop species and variety selection criteria accordingly. With an increasing demand of food per unit area by a fast expanding population, it is imperative that NARS respond by releasing seeds of high-input responsive crop varieties into the agricultural sector. In particular, the use of hybrids must be expanded. To achieve this, the NARS will:

1) reorient its plant breeding programmes to develop varieties that respond to sustainable high-input, high-output technology especially emphasizing diversified crops, such as oil seeds, pulses, cereals (other than rice), vegetables, fruits, etc. that fit into rice-based cropping systems. The NARS will need to respond to farmer's current demands for varieties and crops;
2) design breeding programmes keeping in mind the opportunity of importing improved seed which may be an economic way to obtain improved varieties;
3) develop adequate maintenance breeding units at their regional/central research stations;

4) co-ordinate variety development programmes between scientists and institutes in both public and private sectors by developing common objectives and testing procedures.

11.6. Department of Agricultural Extension (DAE)

DAE will be responsible for promoting newly involved superior crop varieties. For this purpose DAE will:

1) monitor the farmer's response/demand for varieties and transmit farmer's preferences to the NSB so that adjustments to production of breeder and foundation seed can be made;

2) promote new varieties among farmers through demonstration plots;

3) advise NSB on developments in the seed sector;

4) create a suitable career structure for seed technologists in all seed sector agencies so that staff continuity and retention of experience can be achieved;

5) improve facilities at entry points for laboratory testing and post-entry quarantine testing.

11.7. Agricultural Information Services (AIS)

AIS will facilitate dissemination and sharing of information from private and public sector seed agencies and enterprises with the farming public, particularly with respect to promotion of new varieties.

11.8. Bangladesh Agricultural University (BAU)

BAU will undertake the following:

1) Establish/strengthen a course in seed technology, which would cover all aspect of the seed industry from seed breeding to its multiplication and distribution, seed policy and seed industry development;

2) Develop its seed pathology laboratory as a National Seed Health Laboratory which will, besides supporting the university's teaching functions, regularly review the seed quarantine requirements and develop seed technology necessary for the production of healthy seed.

3) Promote the technology and production of inoculum for legume seeds in both public and private sectors.

By order of the President

D. L. Chowdhury
Senior Assistant Secretary.

National Integrated Pest Management Policy 2002

1. Introduction

1.1 Crop Sector in Bangladesh

Agriculture is the backbone of Bangladesh economy, which contributes about one-third to the country's gross domestic product (GDP). Approximately 84 percent of the country's total population is directly or indirectly dependent on agriculture for their livelihood. About 63 percent of the labour force is employed in agriculture sector of which about 57 percent is engaged in the crop sub-sector alone.

Within the crop sub-sector foodgrains, particularly the rice crop dominates in respect of both area and production. At present, rice covers about 75 percent of the cultivated land in Bangladesh. Area coverage by other crops are: pulses 4.64 percent, wheat 3.92 percent, oilseeds 3.77 percent, jute 3.71 percent, sugarcane 1.23 percent, potato 1.11 percent, fruits 0.84 percent and vegetables 1.39 percent. Thus growth of rice crop has got substantial impact on the sectoral performance of agriculture. Although there has been an increase in the foodgrain production in recent years, reaching a level of about 25 million metric tons, the country has to further increase its foodgrain production on a sustainable basis to feed the ever increasing population.

One of the main constraints to increasing crop production is the pests. The word "pest" refers to organisms such as insects, pathogens, weeds, nematodes, mites, rodents and birds that cause damage or annoyance to man, his animals, crops or possessions. According to an estimate, annual yield loss due to insect pest alone is 16 percent for rice, 11 percent for wheat, 20 percent for sugarcane, 25 percent for vegetables, 15 percent for jute and 25 percent for pulse crops.

1.2 Current Pest Management Practices

In Bangladesh, chemical control has been the primary method of pest control in the past. Up to 1974. the Government promoted the use of pesticides by supplying them free of cost to farmers (100 percent subsidy). The subsidy was reduced to 50 percent in 1974. The Government withdrew subsidy completely in 1979 and the pesticide business was transferred to the private sector. However, to deal with emergency situations, the Government should maintain a buffer stock of 15-20 metric tons of pesticides.

After the withdrawal of subsidy, although the use of pesticides declined during early years, their use has been on the increase again reaching 14,340 metric tons of formulated products or 2,462 metric tons of active ingredients in 1999 costing over

one billion Taka in foreign exchange (US$ 18.5 million). Increase rice area, increase in cropping intensity and an increase in the area under high yielding varieties led to the increased consumption of pesticides.

At present 96 pesticides (including one botanical) with 304 trade names have been registered in Bangladesh. In the year 1999, 2,462 tons of active ingredients of pesticides were used in Bangladesh over an area of 13.63 million hectare, which is equal to 180 grams of active ingredients per hectare per year. All these pesticides are imported every year expending hard-earned foreign exchange. Although pesticide use in Bangladesh is relatively lower in comparison to neighbouring countries (e.g India uses 320 grams of active ingredients per hectare per year), the use of pesticide has been increasing rapidly over the past two decades.

1.3 The Need for Integrated Pest Management

In the past, pesticides were considered as the 'panacea' for the control of agricultural pests. Although pesticides may provide temporary relief, it is now widely accepted that indiscriminate and excessive use of pesticides and the long-term dependency on them threaten the sustainability of agricultural production. Over dependence on chemical pesticides is not only expensive but also leads to negative environmental impacts, in addition to increased health hazards to both the growers and consumers of crops.

Considering the facts that:

- Bangladesh needs to increase its food production on a sustainable basis;
- pests continue to cause serious damages to crops; and • the use of toxic pesticides is the main method of pest control and that such continued heavy reliance on chemicals would lead to serious environmental and human health problems, pest resurgence, new pest problems and development of resistance;

there is a need for an alternative method rather than to rely solely on pesticides. Integrated Pest Management (IPM) has now been considered as the most appropriate one in this respect.

The Government of Bangladesh (GOB) is giving due importance to IPM, which has been reflected in the Fifth Five-Year Plan (1997—2002). The Plan stated that:

> *" In the fifth plan period, the integrated pest management (IPM) programme will be intensified andexpanded in order to safeguard crops from pests and combat environmental degradation due to pesticide uses. Collaboration among the local government representatives, extension workers and NGOs will be sought to expand IPM programme."*

In the meantime, IPM has created much awareness among the farmers, policy makers, politicians and the general public of the country. As a result, the need for formulating a policy on IPM was considered at the first national conference on IPM held on 11 February 1999 at the Central Extension Resources Development Institute (CERDI), Gazipur.

The National Agriculture Policy (NAP) under section 7.1 stipulated that IPM will be the main policy for controlling pests and diseases. The NAP has given importance to the following activities for pest control:

- *Farmers will be motivated to use more pest resistant varieties of crops. Modern cultivation practices will be followed so that the incidence of pest infestation is reduced.*
- *Use of mechanical control measure such as light trap, hand net, etc. will be increased and popularised. Biological control measures will be used to destroy harmful insects and preserve the useful ones.*
- *Regular framing and discussion programmes on IPM will be conducted among the farmers under the supervision of Union Agricultural Development Committee with a view to successful introduction and popularisation of the method at the farmers' level.*
- *Pest surveillance and monitoring system will be strengthened.*

At present, IPM has a broad approach to crop production based on a sound ecological understanding. Even it goes beyond the production as it also includes the storage of crops at all levels. IPM enables farmers to grow a healthy crop and to increase their farm output and income on a sustainable basis while improving the environment and community health at the same time.

IPM advocates, among others:

- *growing a healthy crop through proper management of soil, water, fertilizers, pests, etc.;*
- *conservation of biological control agents by avoiding or reducing the use of toxic pesticides;*
- *augmentation of biological control agents;*
- *use of pest tolerant crop varieties;*
- *use of cultivation practices that can minimize pest populations;*
- *mechanical control of pests;*

- *monitoring of field by the farmer on a regular basis;*
- *build-up farmers as experts in their own fields in taking crop management decisions;*
- *income generating activities such as growing of 'ail' crops, fish and prawn culture in the rice field, etc.;*
- *use of pesticides that are not harmful to the environment as a last resort.*

1.4 Integrated Pest Management in Bangladesh

In Bangladesh, IPM activities first started in 1981 with the introduction of the first phase of FAO's intercountry programme (ICP) on IPM in rice crop. However, it was in 1987 that IPM activities began to expand and became a popular topic among people from all walks of life. From 1989 to 1995, the ICP played a strong catalytic role in promoting the IPM concept and approach among the government officials and donor community. This programme provided IPM training to build the training capacity of the Department of Agricultural Extension (DAE) and introduced Farmer Field Schools (FFS) for training of farmers. A number of persons from the non-government organizations (NGOs) were also given training on IPM. As a result of the success of this programme and on the basis of the need for IPM in Bangladesh, a number of IPM projects in rice and vegetables have come into existence which are being executed by different government departments and NGOs.

Through the activities of such projects, a large number of core IPM trainers have been produced in Bangladesh. By the end of 2001, a total of 1,137 persons from DAE and about 300 from different NGOs have been trained as IPM trainers. Also. DAE/UNDP/FAO Project and DAE/DANIDA SPPS Project have so far produced 829 farmer trainers (FTs), In addition to these activities on human resources development, the IPM projects have been active in establishing IPM field school for the male and female farmers and school children; development and promotion of IPM farmer clubs and in the testing and usage of biopesticides, bio-control agents, etc. Thus, with the strong support of the Government, an effective IPM base has already been established in Bangladesh.

Almost one hundred thousand farmers have already received season-long practical indepth training on IPM. But this represents only 0.27 per cent of the estimated 37 million farmers of the country. As in other Asian countries with similar IPM programmes, the IPM-trained Bangladeshi farmers were also able to reduce their pesticide use by as much as 80 per cent along with an increased

yield of about 10 per cent. However, to ensure a significant and positive impact of IPM at the national level, still a large number of farmers have to be trained in IPM and furthermore, they should practice IPM in their fields on a continual basis. For that matter, necessary mechanisms will be established to ensure the expansion and co-ordination for a sustainable IPM programme in Bangladesh.

2. The National IPM Policy

There are many definitions of Integrated Pest Management. The FAO definition of IPM is as follows:

> *"A pest management system that. in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economic injury ".*

In the context of Bangladesh the term IPM includes elements contributing to an effective, safe, sustainable and economically sound crop protection system. It is not limited to pest management system alone.

Clearly, IPM conserves the natural resources such as the soil, flora and fauna and ensures reliability and stability of agricultural production. Ecological and economic sustainability of agricultural production is the long-term goal of IPM.

In fact effective IPM—

- *increases self-reliance of farmers by promoting locally developed and adapted crop management practices;*
- *reduces the risks to farmers, general public and the environment: these include the risks of crop loss and all risks related to the use of pesticides;*
- *brings enormous savings by reducing the use of farm chemicals;*
- *reduces use of pesticides at the national level;*
- *improves the field conditions for beneficial insects and generate extra income as well as nutritious food for the farmers; and*
- *promotes community activities and the formation of farmer groups (e.g. IPM clubs) and facilitates empowerment of both female and male farmers.*

2.1 Objective of the IPM Policy

The objective of the IPM policy is:

> *To enable farmers to grow healthy crops in an increased manner and thereby increase their income on a sustainable basis while improving the environment and community health.*

To achieve the above-mentioned objective, IPM Policy will pursue the following strategies:

- to expand IPM on a sustainable basis by establishing a national IPM programme; and
- to facilitate co-ordination of all IPM activities in Bangladesh.

2.2 Components of the IPM Policy

The following are the key components of the IPM policy:

- Maintaining ecological balance
- Executing appropriate actions on pesticides
- Operating an effective system for implementing the national IPM programme
- Developing human resources as the core of IPM
- Conducting research on IPM

2.2.1 Maintaining Ecological Balance

Sustainabilily of farm outputs requires a holistic approach to agricultural production founded on a sound ecological basis. Under high input intensive agricultural regime, farmers tend to use more agro-chemicals including the pesticides. The misuse of such agro-chemicals could easily lead to ecological disturbance threatening the sustainability of agricultural production. GOB fully realises the importance of ecological agriculture and understands that IPM revolves around eco-friendly agricultural production system. The Government, therefore, considers IPM as an ideal method for conserving natural resources (preserving bio-diversity and natural enemies of crop pests, appropriate genetic diversity for crop production, conservation of natural aquatic populations, etc.) along the pathway of sustainable agricultural development. Although this method currently largely focuses on rice agro-ecosystems, the IPM policy would be applicable to all crops from large plantations to household gardens.

To achieve these :

- Priorities will be given to the management of pests through the use of parasitoids, predators, insect pathogens, appropriate cultivation techniques, pest tolerant varieties, mechanical control measures, crop diversification, botanical products and bio-pesticides.

2.2.2 Executing Appropriate Actions on Pesticides

In the past general perception had been that the pesticides alone would provide effective control of crop pests. However, besides being unfriendly to the

environment, pesticides could also cause serious health hazards to human beings. Furthermore, long-term dependency on pesticides is inevitably a serious threat to the sustainability of agricultural production. Therefore, a number of specific actions regarding the use of pesticides will include the following:

- GOB has banned all World Health Organization (WHO) Class la (extremely hazardous) pesticide compounds, based on formulations, for agriculture purposes and will eliminate compounds in Class Ib (highly hazardous). New proposals for registration of any pesticide fall under. the above categories will be declined.

- For the registration of any pesticide in future, experimental toxicity data on beneficial insects, fish and other aquatic animals under Bangladesh conditions must be taken into consideration.

- GOB will not provide free pesticides to the farmers for ground applications, except under exceptional circumstances as determined by the National Council of IPM.

- Aerial application of pesticides for the control of crop pests shall not be undertaken, except if the National Council of IPM deems it necessary under very exceptional circumstances.

- GOB will avoid receiving any aerial formulation of pesticides as overseas development assistance.

- GOB will provide support and incentives to the private sector organizations for producing bio-control agents (parasitoids, predators and insect pathogens such as fungi, bacteria and viruses) and botanical pesticides locally.

- GOB will review pesticide rules and regulations and amend the same as and where necessary.

- GOB will monitor any misleading advertisement toward using pesticides and will initiate appropriate legal actions against such malpractice.

2.2.3 Operating an Effective System for Implementing the National IPM Programme

Many agencies are actively involved in IPM activities in Bangladesh and more IPM Projects covering a range of crops are forthcoming. For the promotion, expansion and sustainability of IPM, it imperative that a national IMP Programme together with an organizational set-up for its implementation is

developed. In accordance with the National Agriculture Policy (NAP) and the New Agricultural Extension Policy (NAEP), the organizational set-up and the IPM implementation system will have a decentralized, community-based approach that puts farmers at the front, as indicated below:

• The existing multi-sectoral IPM steering committee will be renamed as the National Council of IPM (NCI), This Council will be chaired by the Honourable Minister for Agriculture. The NCI will serve as the apex body for overall coordination of the national IPM Programme, especially for integrating environmental and agro-ecological considerations among the major sectors of the national economy (e.g. agriculture, fisheries, health, environment, etc.) by formulating common strategies for linkage, promotion, expansion, coordination and sustainability of IPM activities in Bangladesh.

- The DAE will be the lead agency for implementing national IPM programme. IPM will be the cardinal principle of plant protection. The organizational set-up for implementing national IPM programme will be constituted within DAE with the IPM coordinating committees and coordinators at different levels (e.g. National, Regional, District and Upazila). In addition, there will be an IPM Technical Committee (ITC) to provide support to the National IPM Coordinator (NIC) and the National Council of IPM (NCI). At the grass-root level there will be IPM teams consisting of IPM-trained DAE staff and farmer-trainers.]

- The job description of the field level staff involved in IPM will be changed to reflect their full-time work on IPM. These grass-root level IPM staff will, in addition to conduct training of farmers in IPM, undertake community IPM-related activities (e.g. farmer-to-farmer training, formation and registration of IPM club and associations, formation of village IPM teams, mobilizing of farm women, participatory action research involving farmers, participatory monitoring and evaluation. IPM in schools, farmer created media for horizontal communication and FFS follow-up) to ensure the promotion, expansion and sustainability of IPM.

- GOB will ensure reallocation of national resources and also look for external resources to support IPM activities. Specifically, GOB will make an annual budget allocation for IPM activities and place the fund with the National IPM Programme. In addition GOB will ensure that a certain portion of the Annual Upazila Development Programme (AUDP) fund allocated for agricultural activities in each Upazila would be reserved for IPM activities.

- The National IPM Programme shall strengthen the implementation of bio-control and plant quarantine activities as well as pest surveillance and monitoring.
- Development Programme (AUDP) fund allocated for agricultural activities in each Upazila would be reserved for IPM activities.
- Programmes for promoting non-chemical pest control methods (e.g. "food for collecting hispa", "food for rat tails collection", etc.) will be strengthened further.
- A regular system for monitoring and evaluation of and follow-up to IPM activities and its impacts at the farmers' level wilt he established.

2.2.4 Human Resources Development as the Core of IPM

• The Government will give high priorities to the development of human resources in IPM. Briefings, orientation and field training on IPM for the farmers will comprise the major elements of implementation of IPM Programmes.

• The human resources development (HRD) initiatives would include :

— farmers, agricultural labourers, school children and teachers (in all cases both men and women);

— field staff from block level to the district and regional level of the Ministries of Agriculture, Health, Environment and Forestry, Fisheries and Livestock, etc;

— field staff of NGOs working in rural areas;

— concerned government staff, policy makers and parliamentary representatives;

— students, faculty members and scientists of agricultural universities and colleges, agricultural training institutes, and National Agricultural Research System (NARS); and

— the general public.

- Efforts shall be made to provide season-long IPM training through Farmer Field Schools (FFS) to as many farmers as possible. The target is to train-up at least one from each farming family.
- Specific curricula will be included in IPM training courses for women extension workers, women farmers and other women household members in support of homestead production and post-harvest activities as well as their role in field crop production.

- IPM training centers at National and Regional levels will be established. At the same time, facilities for supporting field training in Districts and Upazilas will be provided.
- Strategy for different training programmes will be based on community participation and principles offield-based experimental learning in the light of Non-Formal Adult Education.
- The modern practical IPM will be incorporated in the curricula of schools, colleges and universities.

2.2.5 Research on IPM

- Agricultural Research Institutes (ARIs) will give priority for the development of IPM compatible methodologies. Multi-disciplinary research will be promoted for the development of:
    - — pest tolerant varieties;
    - — cultural parctices that minimize pests and optimize the environment for natural crop defenders;
    - — bio-control agents including parasitoids and predators and entomopathogenic bacteria (e.g. Bacillus thuri ngiensis), fungi, viruses, nematodes, etc.;
    - — natural products (e.g. from neem and other botanicals) for pest control;
    - — Improved methods of preservation of grains after indentifying and studying traditional preservation methods, etc.
- Cooperation among crop scientists (including breeders, agronomists, soil scientists, entomologists and plant pathologists), extension workers and IPM farmers will be strengthened.
- Farmer-based crop protection system will be promoted through integration of research and field study activities.

3. Strategies for Implementing IPM Activities and Institutional Set-up of the National IPM Programme

3.1 Strategies for Implementing IPM Activities

- A National IPM Programme together with necessary institutional set-up for its implementation will be established.

- The ongoing IPM Projects of DAE will continue their activities and expand until a critical mass of at least 20 per cent of the farmers in each block would receive adequate training so that they can practice IPM.

- Availability of adequate government and donor funds for the continuation of IPM activities by the DAE projects and for the implemention of the National IPM Programme is to be ensured.

- For the expansion and sustainability of IPM, community IPM activities (such as farmer-to-farmer training, establishment of IPM Clubs, etc.) are to be promoted.

- Collaboration among DAE, NGOs and all other agencies and institutions involved in IBM will be strengthened.

- "International Code of Conduct on the Distribution and Use of Pesticides" would be observed in relation to IPM activities.

- Coordination of activities among different Ministries (Agriculture, Fisheries and Livestock, Health, Environment and Forestry, Education, Local Government, etc.) and NGOs will be ensuerd.

- The Convention on Persistent Organic Pollutants (POP) in reducing or eleminating the production and use of certain pesticides would be observed and implemented.

- IPM related publicity will be promoted through the mass-media and awareness on dangers of pesticides, pesticide residues in food, health and environmental hazards of pesticides will be created.

- A mechanism to monitor pesticide residues in food and the environment will be established.

- A system for certification of pesticide-free agricultural products will be introduced.

- Pest diagnostic centers at each Upazila are to be established.

- IPM Congress will be organized for the IPM trained farmers on yearly basis.

3.2 Institutional Set-up of the National IPM Programme

A national IPM programme will be developed in order to coordinate all IPM activities in the country. The set-up of this programme will be in conformity with the NAP and NAEP. It will suit the decentralized, community-based IPM approach that puts farmers at the front and will cause minimal changes to the existing organizational set-up of the DAE. The national IPM programme will have the following institutional set-up :

3.2.1 **Upazila level**

Farmers, Farmer Field Schools, Farmer groups, Farmer associations, and IPM clubs are the ground level operators of IPM.

The Upazila IPM Coordination Committee (UICC): The UICC will be responsible for planning and coordination of all IPM activities at the Upazila level. The UICC will also be responsible for maintaining close liaison with the local government at the Upazila level. The UICC will act as a sub-committee to the Upazila agricultural Extension Coordination Committee (UAECC). A full-time season-long IPM trained Agricultural Extension Officer (AEO) will assist the UICC in all technical matters related to implementation and coordination of IPM activities. Elected public representatives and farmer representatives will be included in the committee.

3.2.2 District level

District IPM Coordination Committee (DICC) : The DICC will be responsible for planning and coordination of IPM activities at the District level. The Deputy Director of Agricultural Extension of respective district will be the chairperson of DICC. The DICC will be assisted by a full-time Plant Protection Specialist (PPS) with short training in IPM. A full-time season-long IPM trained AEO will assist the PPS.

3.2.3 Regional level

Regional IPM Coordinator (RIC) : The Additional Director of Agricultural Extension of the respective region will be the RIC. The RIC will be responsible for the management, monitoring and coordination of all IPM activities in the region. The RIC will be assisted by a Deputy Director and a full-time season-long IPM-trained AEO.

3.2.4 National level

Deputy National IPM Coordinator (DNIC) : Director of the Plant Protection Wing of DAE will be the DNIC. The DNIC will be solely responsible for the

day-to-day implementation and management affairs of all IPM activities throughout the country. The DNIC will also assist the National IPM Coordinator (NIC) in this connection. An Additional Director (IPM) and Deputy Director (IPM) will assist the DNIC on fulltime basis.

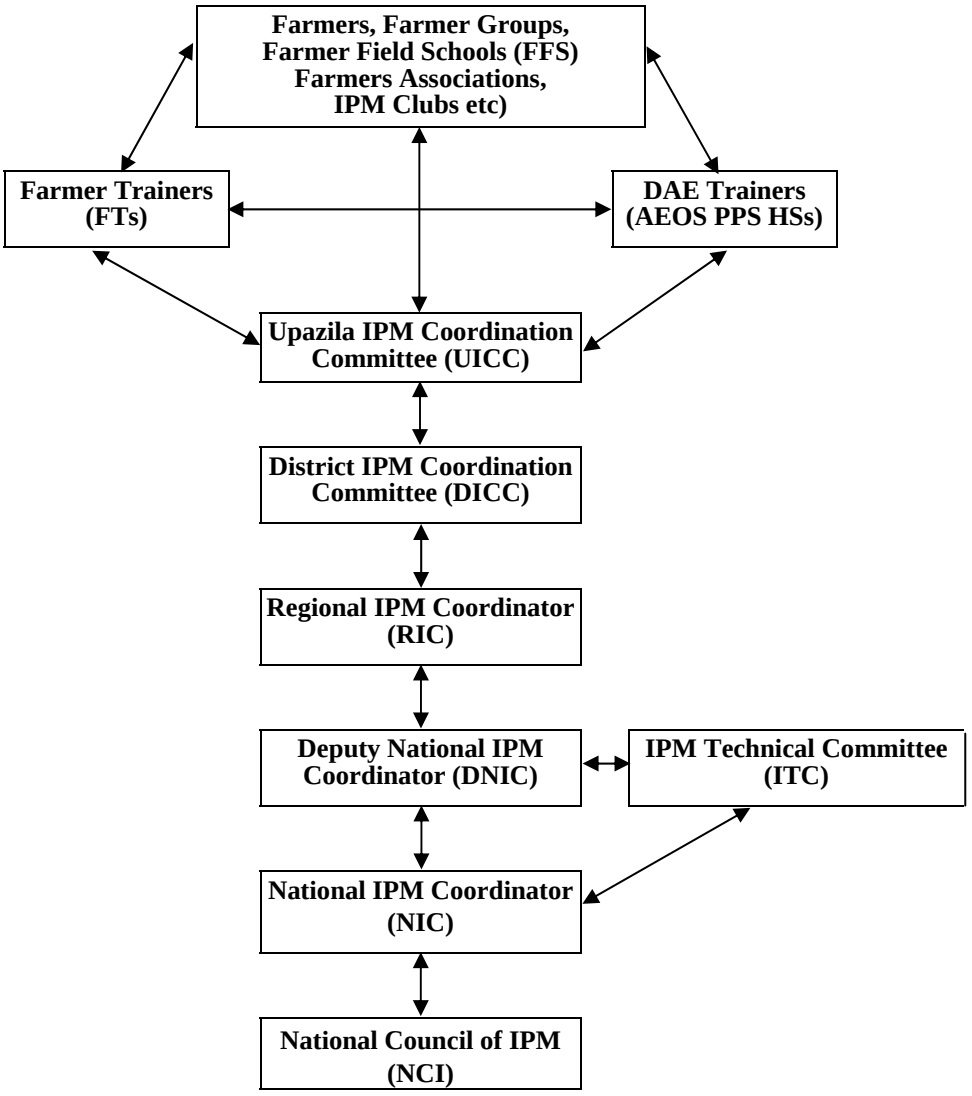
National IPM Coordinator (NIC) : The Director General, DAE will be the NIC who will have the overall responsibility for implementing the national IPM programme and coordinating all IPM activities throughout the country. The NIC will also be responsible for the establishment of sectoral linkages and promotion, expansion and sustainability of IPM in Bangladesh. The NIC will provide all necessary assistance to the National Council of IPM (NCI) as member-secretary of the later.

IPM Technical Committee (ITC) : The ITC will porvide support to the Deputy National IPM Coordinator and the National IPM Coordinator in all technical matters. The members of ITC will be the Director Plant Protection (Chairperson), national experts and technical advisors of different ongoing IPM projects, representatives of different sectors (agriculture, health, education, environment, fisheries and livestock, etc.), representatives of NGOs, agricultural universities, agricultural research institutes and representatives from the private sector involved in pesticide business.

National Council of IPM (NCI) : The Honourable Minister for Agriculture will be the chairperson of the NCI. The existing multi-sectoral IPM steering committee will be renamed as the NCI. Its members will include representatives (not below the rank of Joint Secretary) from different Ministers (e.g. Environment and Forestry, Fisheries and Livestock, Health, Local Governmment, Planning, Finance, Education. Information, etc.), the Executive Chairman of BARC and the Director Generals of DAE, BARI, BRRI, BJRI, BSRI, FRI, BLRI, BFRI and BINA. The chief technical advisors and senior technical advisors of ongoing IPM projects, representatives of NGOs private sector and professional organizations involved in IPM will also be the members of NCI. The National IPM Coordinator will be the member-secretary of the NCI.

The NCI will serve as the apex body for overall coordination of the national IPM programme. The Council would act especially for integrating different IPM issues into the agriculture, fisheries, health and environment sectors of the national economy and will deal with common strategies, linkage, promotion, expansion and sustainability of IPM activities in Bangladesh.

Fig. 1 : Institutional Set-up of the National IPM Programme



4. Conclusion

IPM has a broad-based approach founded on a sound ecological understanding towards producing and preserving different crops. Now-a-days, IPM has been considered globally as one of the best methods in this regard. It is hoped that the country's crop production and preservation system will be much developed through the implementation of National IPM Policy, which has been formulated with a view to get the full benefit of his unique method. At the same time, working relationship and cooperation among the extension workers, farmers and NGO staff will be developed through their involvement in the process of IPM

training, resulting in efficiency and acceptability of IPM activities throughout the country. The use of harmful pesticides will be much reduced if the farmers practice IPM in their fields, which in turn, will enhance the production level and improve the environment and the public health. Proper implementation of this policy would increase the farm output that will raise the income level of vast majority of the country's farmers. Thus a positive impact on the overall economy will help reduce the country's poverty situation which would be expected through implementing this policy. However, the National IPM Policy will be reviewed in respect of time and be revised and up-dated in line with the changing agricultural production system of the country.