Krishi Gobeshona Foundation
A Research Initiative for Sustainable Agriculture in Bangladesh
TECHNICAL BULLETIN
No.12, 2011

Adaptation practices for crop production in climate change vulnerable areas in Bangladesh

Project Code : C-CC-129

Principal Investigator : Dr. Md. Moslem Uddin Mia, Senior Agriculture Specialist

Implementing Organization: Bangladesh Centre for Advanced Studies, Dhaka

Duration : May 2009 to May 2011

Introduction

Bangladesh is one of the most climate change vulnerable countries in the world. Climate change impact is increasingly felt on the performance of crops, livestock, fisheries and agro-forestry. Vulnerabilities due to climate change are likely to aggravate more in the future. Majority of the people living in vulnerable areas are engaged either in crop production and/or fishing. They frequently remain unemployed due to tidal flooding and other natural hazards resulting in food insecurity. Krishi Gobeshona Foundation provided both financial and technical support for finding and alternative production technologies and practices that these hard hit people may adopt to cope with the situation. The objectives of the project were

- To assess the impacts of climate change hazards on crop production in the areas vulnerable to drought, flood, salinity/tidal surge and soil erosion;
- To evaluate the severity and extent of extreme conditions affecting crop production in vulnerable areas; and
- To screen, identify and suggest some innovative farming practices to improve crop production and mitigate sufferings.

The coastal region has over 30% of the country's net cultivable land. This vast cultivable area is under great threat of vulnerabilities of crop loss/food insecurity due to saline water intrusion, sea level rise, water stagnancy, cyclone, storm, tidal surge land slide and soil erosion. Vast terrain (161000 lac ha) of CHT and Sylhet districts hilly areas have ample opportunities to grow fruit and vegetables.

Approach and Method

Information on adaptation practices being followed and the extent of use by farmers in different vulnerable areas were collected through focus group discussion (FGD). Data/information on land degradation, land uses, changes in major crops/cropping patterns, change in climatic factors (temperature, rainfall, etc), climatic risk factors affecting crop production, and identify innovative adaptation practices etc were collected interviewing

farmers in the vulnerable areas. Impacts of climate change on crop production was assesses organizing FGDs in Rajshahi, Sirajganj, Kurigram, Gaibandha, Satkhira, Rangamati, Khagrachari, Bandarban, Barisal, Pirojpur, Patuakhali, Cox's Bazar and Sunamganj districts. During FGDs, data on weather and environmental parameters like maximum and minimum temperatures, rainfall, droughts, flood, submergence, cycle, tidal surges, salinity, frequency and severity of extreme climatic events (cyclone, tidal surges, floods etc), crop damages due to risk factors were collected. Long-term impact of climate changes in utilization of land for crops and changes in crops /cropping patterns in drought and flood-prone areas, hills and coastal districts was compiled and evaluated.

Results/Outputs

The average cropping intensity (%) in the coastal areas has not increased as much compared to flood plain agriculture during 1975-2006. About 30-50% of net cropped areas) remain fallow in rabi and Kharif-1 seasons in the coastal region, mainly due to salinity, waterlogging and drought. Yield reduction in T.Aman is mainly due to tidal floods preventing growing HYVs, cyclone increased pest-incidences etc due to climate changes. High temperature and increased salinity reduce the yield of HYV boro rice. Yield reduction of vegetables, pulses and oil seeds is due to late planting owing to late harvest of T.Aman rice, waterlogging and early tidal flood. Zero tillage (potato/maize), floating bed (vegetables/vegetable seedlings), ditch-dyke system for crop and fish culture, homestead gardening, and utilization of gher areas may be potential adaptation options.

In the drought-prone areas, most fields remain fallow during winter and Kharif-I season after harvest of T.Aman due to moisture stress. Growing crops with zero tillage (maize), mulching (potato), priming (chickpea), homestead gardening and dryland farming (sesame) are promising adaptation options.

In the areas prone to flood/flash flood, crop fields remain deeply flooded during monsoon allowing no crop growning in Kharif II season. Receding flood water from the field is also delayed in rabi season. Zero tillage (maize/potato, garlic), raised bed cropping (ditch & dyke or Sorjan system), floating bed (vegetables/vegetable seedlings) and raised bed (vegetables) may be some adaptive practices.

Vulnerability	Yield loss
Drought prone areas	30-60% yield loss in T. ama, wheat, potato, maize, pulses, oilseeds
Flood-prone charlands	20-60 % yield loss in T.Aman, boro, wheat, maize, potato, pulses, oilseeds, spices and fruit crops
Salinity/tidal surge & Coastal Char lands:	30-60 % yield loss in T.Aman, boro, wheat, maize, potato, sweet potato, pulses, oilseeds, spices

Raised bed at Sirajgonj under flood prone ecosystems

Changes in distribution and intensity of rainfall pattern observed over years in hilly regions might be attributed to global climate change. This has accelerated soil erosion and land slides. Innovative practices like agro-forestry farming, zero or minimum tillage following dibbling /pegging method (ginger, turmeric, maize, tomato), rain water harvesting, terraces in the foothills, improved jhum, community based seepage water harvesting, homestead gardening, floriculture, etc, have been identified /documented as adaptation options in hill agriculture.

Followings are the long-term impact of climate change:

- *Cropping intensity*: Decreased.
- *Changes in annual rainfall:* Decreased in Kharif season affecting rainfed crop
- *Changes in temperature:* Rabi maximum temperature increased and minimum temperature decreased affecting rabi crops
- *Soil salinity in the coastal region:* Average soil salinity range -2.8-18.5 dS/m increased 4.0-42.8 dS/m (almost double)
- *Increasing salt affected areas:* From 750,350 ha in 1973 to 950,780 ha in 2009 (27% increase)
- *Increasing river water salinity:* 13-25% increase (Bishkali river, Andarmanik river, Payra river)

Benefits/Outcomes

- Adaptation options and sustainable production packages for different climate vulnerable areas (drought and flood-prone areas, salinity/tidal surge and hilly areas) have been identified, tested and validated. These packages of practices, if adopted, would potentially benefit farmers.

- Results obtained/documented on crop loss /yield reduction would help create awareness among the stakeholders of vulnerable areas and motivate them to adapt suggested options for mitigating sufferings and improving food security.

Recommendations

- Suggested innovative farming practices should be promoted for large scale adoption in vulnerable areas for increased production, income generation and livelihood improvement of the people living in those areas.

- More innovative farming practices/technologies should be developed, tested and adopted through on-farm trials and location-specific production programs involving farmers, researchers and extension personnel.

Expected Impact

The suggested sustainable /innovative options for different vulnerable areas, if adopted and up-scaled, would help the stakeholders to cope with the adverse situation and icrease productivity, food security, and improve farmers' income and livelihood.

Note: *This bulletin has been prepared based on a completed CGP Project entitled "***Adaptation practices for crop production in climate change vulnerable areas in Bangladesh"** *implemented under GoB-World Bank funded NATP Phase-I.*

September 2011

KRISHI GOBESHONA FOUNDATION

A non-profit foundation to support CGP for agricultural research

National Agricultural Technology Project **(NATP): Phase-I**, GOB/IDA; Reg. No. C- 684(05)/07

Bangladesh Agricultural Research Council Campus, Farm gate, Dhaka-1215

Telephone: 880-2-9111041, Fax: 880-2-8153872, Website: kgf.org.bd, E-mail: kgf-bd@live.com