



Bringing Green Revolution to Eastern India: Genesis, Objectives and Implementation

H Pathak, AK Nayak and BB Panda

The National Program of “Bringing Green Revolution to Eastern India (BGREI)” is the outcome of the recommendations of the Task-Force constituted by Government of India in pursuance of the decision taken in the meeting of the Committee of Secretaries held on November 29, 2009 to make short- and medium-term recommendations for efficient management of water, energy and other inputs to maximize agricultural production on a sustainable basis. The Task-Force was *inter-alia* ascribed to assess the existing scenarios of water resources development, utilization and management of foodgrain production in Eastern Indian states namely Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, Eastern Uttar Pradesh and West Bengal. This Program was intended to address the constraints limiting the productivity of “Rice-based Cropping Systems” in Eastern India so that crop productivity is reasonably enhanced and stabilized. The farmers were exposed to nascent technologies through this Program with adequate technical backstopping from research institutes to attain higher skills and economic empowerment.

Accordingly, the “Bringing Green Revolution to Eastern India (BGREI)” Program was initiated in 2010-11 to address the constraints limiting the productivity of rice-based cropping systems in Eastern India comprising of seven states with the following objectives.

1. To increase production and productivity of rice and wheat by adopting latest crop production technologies;
2. To promote cultivation in rice fallow area to increase cropping intensity and income of the farmers;
3. To create water harvesting structures and efficient utilization of water; and
4. To promote post-harvest technology and marketing support.

The following strategies were adopted to achieve the objectives.

1. To promote improved production technologies of rice including popularization of newly released high yielding cultivars and hybrids;
2. To bring rice fallow areas under cultivation through cropping system based approach;
3. To popularize adoption of stress tolerant varieties;
4. To create irrigation structures such as farm ponds and lift irrigation to improve irrigation potential;
5. To promote use of farm machineries and implements suitable for small land holding sizes;
6. To create infrastructure such as go down, procurement centre and marketing infrastructure;



7. To provide technical backstopping by scientists of ICAR-NRRI, SAU and other ICAR institutions to implement the Program.

During 2010-11, major focus of the states was on promotion of improved crop production technologies of major crops, water harvesting measures and their utilization for overall agriculture development. In the subsequent years 2011-12 and 2012-13, the program provided a more focused approach on medium and long-term strategies for asset building activities of water conservation and utilization along with short-term strategies pertaining to transfer of technology of major cereals. During 2013-14, based on the experience of last three years of implementation of the program, marketing support including post-harvest management was included as an intervention. Various improved production technologies were introduced in the subsequent years.

Accordingly, the BGREI comprised of nine broad categories of interventions such as (i) cluster demonstrations of major production technologies like direct-seeded rice, line transplanting, system of rice intensification (SRI), stress tolerant varieties and hybrids and cropping system-based demonstrations in farmers field; (ii) production of certified seeds; (iii) distribution of certified seeds; (iv) nutrient management and soil ameliorants like micronutrients, lime, bio-fertilizers and gypsum to improve the soil fertility; (v) integrated pest management including chemicals and bio-pesticides/bio-agents and herbicides; (vi) asset building activities like construction of shallow tube wells / bore wells / dug wells, pump sets, tractor drawn zero drill seed cum fertilizer drill, threshers, power tillers, cono-weeders, tractors, translators, and threshers; (vii) site-specific activities for facilitating petty works such as construction/renovation of irrigation channels/electricity for agricultural purposes in a cluster approach for convenience and cost effectiveness; (viii) post-harvest management and marketing support including storage, processing, transportation and marketing; and (ix) cropping system-based trainings to enhance the knowledge of the farmers. Under the BGREI Program, adoption of new varieties, farm machines and implements, nutrients, pesticides and knowledge-based interventions are being promoted in different agro-climatic zones of eastern Indian states.

Provision of funds for implementing the Program was made in the Union Budget under *Rashtriya Krishi Vikas Yojna* (RKVY). The approval of action plan of each state is finalized by the GOI in consultation with the states. The action plan so approved by GOI is approved by State Level Sanctioning Committee (SLSC) on the pattern of RKVY for issue of GOI administrative and financial sanction and subsequent release of funds to state.

To review the implementation of the Program at national level a Central Steering Committee was constituted under the Chairmanship of Secretary (A&C) with Deputy Director General, ICAR; Additional Secretary (Seeds and RKVY); Commissioner (Water Resources); Agricultural Commissioner and Director, ICAR-NRRI as members and Joint Secretary (Crops) as Convener. The Committee was mandated to provide suggestion for improvement in the structure of interventions and to resolve various inter-ministerial issues. For each of seven BGREI states, a State Steering Committee (SSC) was set up under the Chairmanship of Agriculture Production Commissioner/Principal Secretary (Agriculture) to review the Program, finalize State Action Plan in consultation with ICAR/SAUs and monitor the progress of technical backstopping by NRRI/SAUs/ICAR Institutes. The function of this committee is to sort out different inter departmental issues affecting crop production. A District Steering Committee is constituted under Chairmanship of District Magistrate/Chief



Development Officer to prepare District Action Plan on the basis of previous experiences, the BGREI guidelines and latest technology, to arrange timely delivery of inputs to the identified beneficiaries of the program, to ensure quality control of inputs, to release incentives to beneficiary farmers and input suppliers, to liaise with NRRI/SAUs for ensuring and facilitating technical backstopping.

A National Level Monitoring Team (NLMT) was constituted for each state for monitoring the activities of the Program. The team visited different states at least once in a crop season and submits the report to Agriculture \ Production Commissioner of the state; Joint Secretary (Crops) and Director, Directorate of Rice/ Development (DRD), Patna. National Consultant (BGREI) was assigned to present the consolidated report to Agriculture Commissioner, GOI. A District Level Monitoring Team was set up under the Chairmanship of District Agriculture Officer. The team visited thrice in a crop season and submits the report including crop-cutting data to Director of Agriculture of respective states.

ICAR-National Rice Research Institute (NRRI), Cuttack is the nodal technical institution to supervise, guide and improve the quality of the interventions. It organizes scientific documentation of various interventions as approved in the strategic action plans. A consolidated report is submitted by ICAR-NRRI by every 1st week of the month and a final quarterly report submitted by them to the CSC following structured proforma. ICAR-NRRI prepared the proposal for mobility, contingencies and other project specific needs by identifying the partner institutions in each BGREI state and its scientists assigned for the project.

The BGREI Program was implemented in 149 districts across seven states in Eastern India till date. From the financial year 2014-15, about 118 non-NFSM districts are being covered under the program in seven states i.e., Assam (14 districts), Bihar (23 districts), Chhattisgarh (14 districts), Jharkhand (20 districts), Odisha (22 districts), Eastern Uttar Pradesh (14 districts) and West Bengal (11 districts). NRRI provides the technological backstopping to the Program involving 127 scientists from 2 ICAR Research Institutes and 11 Agricultural Universities of states. About 497 man-days were spent for technical backstopping of the Program. Rice varieties i.e Swarna sub-1, Sahbhagi Dhan, JKRH-3333, RHR-111, PSC-785, DRRH-7, CRH-5, KRH-7 and NPH-924 in Assam; Rajendra Bhagawati, Arize-6444, 27P31, Sahbhagi Dhan, Rajendra Mahsuri and PHB-71 in Bihar; Swarna Sub-1, Indira Barani dhan-1 Vishnu bhog, Sahbhagi Dhan, CO-4, Arize-6444 Gold, Sayadri-4 and US-312 in Chhattisgarh; IR 64 (DRT 1), PNPB 24, Sahbhagi Dhan and Abhishek in Jharkhand; Swarna Sub 1, Reeta, Naveen, Pratikshya, MTU 1001 in Odisha; NDR 8002, SHIATS Dhan 1, PA 6444, NRR 2064, PHB 71 and RH 1531 in Uttar Pradesh; Swarna sub 1, DRR 42, Sahbhagi Dhan, IR-36, MTU 1010, PD 18, Rajendra Masuri, PAN 802, PAC 8744 in West Bengal has already been popularized under the Program.

The major production technological interventions i.e., direct-seeded rice (50663.6 ha), line transplanting (1.43 lakh ha), system of rice intensification (2.22 lakh ha), stress tolerant varieties (2.65 lakh ha), hybrids (3.85 lakh ha), HYVs (8.18 lakh ha) and cropping system based management (2.14 lakh ha) were made through cluster demonstrations under the program in the seven eastern Indian states from 2010-11 to 2017-18. Likewise about 4.62 lakh ha area was demonstrated with improved management practices under wheat crop. The total area covered under cluster demonstrations of improved production technologies of rice till 2017-18 varied from 7.1% in Eastern UP to 20.4% of the total rice area of the BGREI



states. Total area under demonstration has increased from 0.5-1.0% to 2.5-3.5% in different states by 2017-18. The average yield increase in direct seeded rice, line transplanting, system of rice intensification, cropping system based demonstration, stress tolerant varieties demonstrations were to the tune of 31.28, 24.89, 26.54, 23.35 and 25.94% respectively over farmers practice in Odisha whereas 28.02, 30.09, 34.97, 28.59 and 22.52%, respectively in Chhattisgarh. Besides, about 28.25% yield increase was achieved through demonstration of hybrids in Chhattisgarh.

Integrated pests management activity was taken up in 5.95 lakh ha out of which plant protection chemicals and bio-pesticides/bio-agents in 3.71 lakh ha and herbicides use in 2.24 lakh ha area. Besides, 7.62 lakh ha of rice demonstrations were covered with application of micronutrients in 5.05 lakh ha, lime in 7217 ha, gypsum in 7.69 lakh ha and biofertilizers in 2.42 lakh ha till 2017-18. Under asset building activity, total 7.62 lakh of implements were provided to the beneficiary farmers. About 2721 seed drills, 226 drum seeders, 13655 rotavators, 835 self-propelled paddy transplanter, 2.43 lakh of pumpsets, 39870 cono-weeders, 37 laser land leveler, 334 reapers, 690 MB ploughs, 504 leveler blade, 170676 manual sprayers, 15190 Power knapsack sprayers, 73 power weeder, 5928 paddy thresher, 4087 multi crop thresher, 106 tractors, 18 tractor operated rubber roller sheller, 1275 check dams and Lift Irrigations were constructed, 6666 paddy weeders, 6666 paddy transplanters, 3582 reaper-cum-binder and 5972 8-BHP capacity power tillers were distributed through the program since inception. Besides, 56407 bore wells and dug wells and 131366 shallow tube wells were also created under this activity for irrigating the crop. About 51430 hybrid maize seed minikits were distributed.

Under site specific activities, 164 minor irrigation tanks, 347 water harvesting structures, 428 community cluster bore well, 125 pucca irrigation channels were constructed and 940 pucca check dam were constructed for irrigating the crops. Besides, 2.43 lakh meter of PVC pipes were provided for carrying water to crop fields. Under post-harvest & marketing support, 89 mini rice mills, 2210 godown/ storage structures, 519 pucca threshing floors, 1861 house hold level paddy processing yards (HPPU), 2806 community paddy stacking yards, and 51 community drying platforms were constructed. About 7232 cropping system-based training programs were conducted for the farmers in eastern Indian states. These farm equipments have already sown the seeds of revolution for small farm mechanization. This needs to be nurtured in time to come to ensure reducing the cost of production, productivity enhancement and bringing resilience against the climate change. The small mechanization will fuel the growth of rural industry in term of repair maintenance of these machineries ensuring the growth in employment.