

1.0 Present Scenario

The growth of agriculture in a sustainable manner is essential for meeting food, fibre and other demands of rising populations, enhancing rural livelihoods and for stimulating national economic growth. In recent times, the issues surrounding agricultural development have changed and the sector faces several new challenges arising from an inter-related and complex set of problems. With markets driving agricultural growth, technological change and innovation have become more pluralistic than in earlier years, as they can be led by different actors from public and private sectors. In addition, the sustainability of the natural resource base of agricultural production has become a cause for serious concern. These concerns are compounded by climate change, changes in intellectual property regime, and the new transformations in interactions between the agricultural sector, industry and civil society. Based on the existing and potential resources, Uttar Banga Krishi Viswavidyalaya aimed to provide scientific basis for enhancing and sustaining productivity in the farming sector with modern agricultural technologies/innovations to improve food security, safety and quality by quality education, research, information dissemination and agro-based industrial liaison which will give impetus for accelerating rural development in last 10 years. At the same time, new developments in science and technology can create new opportunities for agricultural development, if these are effectively integrated into research, education and extension. In this respect, Uttar Banga Krishi Viswavidyalaya caters teaching, research and extension of agricultural sciences in northern part of West Bengal covering six districts namely, Malda, Dakshin Dinajpur, Uttar Dinajpur, Darjeeling, Jalpaiguri and Cooch Behar. All these districts collectively cover three agro-climatic zones viz. (i) Hill Zone, (ii) Terai Zone and (ii) Old-Alluvial Zone. Darjeeling district is being treated separately as it is situated in hilly region for which research strategies for hill agriculture assumes much importance. As an institution in the knowledge domain, committed to strengthening human resource and institutional capacities in agriculture for innovation and change, the vision, mission and strategy of UBKV need to be based on an assessment of the future role and needs of the agricultural situation. These, in turn, will depend on an assessment of the emerging scenario in North Bengal agriculture, and the implications for managing agricultural system as a whole.

The horticulture industry continuously evolves to adopt to the ever-changing marketplace and the new technologies used to optimize available resources. The increasing

popularity of fresh horticultural produce in the marketplace has given a boost to the industry. From the technological perspective, the horticultural industry is still catching up with the rest of the agro-food industry. Inroads are being made to boost the productivity of the industry. However, growers continue to experience excessive losses because of problems with the consistency in production inputs, crop quality, scientific management of post harvest handling and organized marketing channels.

Critical challenges faced by the industry include high production cost, non-availability of genuine propagating material, non-availability of standardized techniques for production of crop that suit the market demand, insufficient training and demonstration for maintaining produce quality and nonexistence of post harvest infrastructure.

A system must be developed to attain and maintain the quality of produce, identify critical areas in the post harvest chain that generate losses, identify potential domestic and export market and build professional relationship between trader and farmers.

The northern part of West Bengal has been a potential hub of horticultural activity with wide range commercially important horticultural crops grown. During 2007-08, total fruit production of North Bengal was around 912.52 thousand tonnes which was about 33% of West Bengal's fruit production. Vegetable production has been a great success story in North Bengal with production of 3558.06 thousand tonnes during 2007-08 from almost no vegetable production three decade ago.

Per capita availability of fruit crop is much higher as compared to South Bengal. Taking 100g of fruit as recommended daily intake, total fruit requirement to meet the nutritional need for the people of North Bengal would be around 627.95 thousand tonnes. Assuming 30% crop loss, the available fruits still remain to be 638.76 thousand tonnes. Whereas, in South Bengal, total requirement of fruit is estimated to be 2706.24 thousand tonnes, however, considering the loss the available amount of fruit is only 1297.91 thousand tonnes. Therefore per capita availability of fruit in South Bengal is 48g.

Similarly, for vegetable crops, an estimated requirement to fulfill the nutritional requirement of estimated population as per 2011 census would be around 1884 thousand tones. Total vegetable production during 2007-08 for six districts of North Bengal was 3558 thousand tones, which mean an excess amount of 606.642 thousand tones are still available even after accounting for a post harvest loss of 30%.

Thus, the situation of fruits and vegetables production indicates a possible explosion of export business and processing industries. Therefore, this zone awaits an incremental activities related to post harvest loss reduction and export promotion to surge the socio-economic development of the farmers.

Agricultural Growth :

Agriculture in India needs to grow annually at over 4%, and food grains at 1.5 to 2% to keep pace with rising population and incomes. Agriculture of West Bengal contributes nearly 22.9% (2000-01) towards country's GDP as compared to nation's average of nearly 20% (presently 15.9%). Economy of this region is agriculture-based. The following recurring and emerging issues on agricultural growth was found in the jurisdiction area of UBKV.

- (a) Decline of Net Cropped Area: It is reduced by 1% from 1267680 ha (1990-91) to 1254550 ha (2000-01).
- (b) Slight increase of Cropping Intensity: Considering all districts, it ranges from 161 to 192 in 1990-91 to 169 to 220 in 2007-08.
- (c) Reduction of Area under Food-grain: According to latest data, it is declined by 10.65% from 1991 to 2007-08 compared to State's 1.93%.
- (d) Increase in Production of Food-grain: Increased by 41% from 2187600 ton (1990-91) to 3095200 ton (2007-08) compared to State average of 42.5% from 11270100 ton (1990-91) to 16060500 ton (2007-08).
- (e) Enhancing Productivity of Food-grain: Increased by 44% from 1596 kg/ha (1990-91) to 2305 kg/ha which is much lower of State's average 2573 kg/ha.

Among the food-grains production, Cereal Crops occupies the lion's share. Let us see the status of **Cereal Crops** in this zone.

- (a) Declining Trend of Area : Area reduced by 7% from 1434700 ha (1990-91) to 1329700 ha(2007-08). But there no change of area at State level.
- (b) Increase of Production: Nearly 43% (3054000 ton, 2007-08) increase of production was observed.
- (c) Up-gradation of productivity: Almost 60% higher yield (2344 kg/ha in 2007-08) was obtained during the same period though State's average is 2578 kg/ha which is nearly 10% higher.

Among the **Cereal Crops**, area under Rice has been declined by 12.61% which is much higher if compared with the State (1.93%). Area under **Aman Rice** shows 14.4%

decline whereas **Boro Rice** has an increasing trend (57%). Uttar Dinajpur, Dakshin Dinajpur and Cooch Behar are the main producers.

Other Cereal Crops like **Wheat and Maize** show 38% and 39.57% increase respectively in term of area under cultivation during this period.

Pulse has shown less prospective information i.e. both area and production are in decreasing trend. But productivity increased by 7%. Malda district is the main producer.

Oilseed is found little bit successful in Malda district only with 1047 ha of land.

Area, production and productivity of **Jute Crop** are in higher trend although productivity is lower to State average. Nearly 221100 ha land is cultivated under Jute. Malda and Cooch Behar districts are found to be most promising. Dakshin Dinajpur is popular for its **Mesta** fibre production.

In case of **Potato**, area under this crop is increasing with very high rate (338%). Production and yield are also attractive. Yield rate of this crop is higher (26436 kg/ha) compared to State (24704 kg/ha). Jalpaiguri is the most promising Potato producing district in North Bengal.

Horticultural growth :

Immense scope for horticultural development in North Bengal is truly reflected by superior quality production of some fruit crops like Pineapple, Mango, Litchi, Mandarin etc.,

Mango: The production and productivity of mango have experienced an increase of almost 100% in last few years. In 2003-04, the production of mango was 106.196 thousand tones with a productivity of 3.544 mt/ha and in 2007-08, it was 216.41 thousand tones with a productivity of 6.846 mt/ha. However, the area under mango only had a marginal increment from 29.962 ha to 31.61 ha during that period.

Banana: Another major fruit crop of north Bengal. The production of banana has shown a marginal increase from 107.447 to 123.12 thousand tones during the period from 2003-04 to 2007-08. Productivity however, was found to decrease marginally from 19.564-18.541 mt/ha.

Pineapple productivity in North Bengal is the highest in the country. During the year 2003-04, 244.8 thousand tonnes of pineapple was produced from 8.187 thousand hector of land area with a productivity of 29.54 tonnes/ha. A steady increase in area under Pineapple was observed until 2006-07, when 308.25 thousand tones of pineapple was produced from an area of 11.17 thousand ha. Since then the area under this crop was found to decrease

marginally due to shift towards tea, however the productivity is increased to 30.7 mt/ha during 2007-08.

Jackfruit, another widely cultivated fruit crops of this region, recorded a production of 69.4 thousand tones with an average productivity of 18.045 tonnes/ha during the year 2005-06. The production of jackfruit was 87.42 thousand tones during the year 2007-08.

Litchi: The production of litchi during 2007-08 was 20.4 thousand tones. It remained fairly constant over years. There is definitely scope for increasing area under this crop.

Mandarin: During 2007-08, total production was 36.45 thousand tonnes from an area of 3.74 thousand ha. Though it is one of the remunerative crops, neither the area nor the production of this crop is encouraging.

Tomato: there is almost 46% increase in tomato production from 259.398 thousand tones during 2003-04 to 377.73 thousand tones during 2007-08. The productivity of this crop has increased from 17.424 to 24.245 tonnes/ha during that period. However, the area under this crop is almost constant.

Cabbage: During 2007-08, the production of cabbage was 585.51 thousand tones from an area of 21.8 thousand ha with a productivity of around 26.86 tonnes/ha. Over the years the production statistics of this crop remained fairly constant.

Cauliflower: During 2007-08, the production of cauliflower was 461.78 thousand tones from an area of 18.33 thousand ha with a productivity of around 25.193 tonnes/ha. Over the years the production statistics of this crop remained fairly constant.

Peas: During 2007-08, the production of peas was 51.35 thousand tones from an area of 8.21 thousand ha with a productivity of around 6.255 tonnes/ha. The production of peas is almost constant over the last few years.

Cucurbits: Cucurbits cultivation in North Bengal has seen a growth of 38% from 416.538 thousand tones during 2003-04 to 576.87 thousand tones during 2007-08. Area under various cucurbits remained almost stagnant.

Brinjal: Brinjal is one of the important vegetable cultivated in this zone with a production of 734.47 thousand tones in an area of 42.38 thousand ha. However there is a marginal decrease in production over previous year until which, it has shown a steady increase in production.

Chilli: One of the major spices grown widely was estimated a production of 26.237 thousand tones in an area of 25.521 thousand ha during 2005-06. Over the years, the productivity and the area under crops have shown a increasing trend.

Ginger: Ginger production was estimated to be 49.813 thousand tones from 6.52 thousand ha land during 2005-06. The production and productivity remained stagnant for last few years.

Turmeric: Total turmeric production during 2005-06 was 10.631 thousand tones from 7.476 thousand ha. A steady increase in production of 10% was noticed during last few years.

Large Cardamom: Large cardamom production of 0.856 thousand tones from an area of 2.98 thousand ha was recorded during 2005-06.

Population pressure:

Districts of Northern Bengal constitutes nearly one fifth (19%) of State's total population. During the period 1991 to 2000-01, increased of population was relatively higher (27%) compared to the State average (17%). Contribution of Schedule Castes (SC) and Schedule Tribes (ST) people is also significant (approx. 41%) in 2000-01). Nearly 86% of the population lives in rural areas. Agricultural activities are dominated mainly by small and marginal farmers (95%) in 2000-01) with average size of holding being 0.44 ha. Fragmentation of holdings continues to remain at an increasing rate which indicates prevalence of huge number resource-poor agricultural farming communities. It is also seen that per capita rural people of West Bengal consume higher quantity (12 kg/month) of cereal food in relation to Country's average (approx. 10kg/month). Low economic status of rural people is also clear from the per capita consumer expenditure i.e. Rs.629.86 compared to Nation's Rs.695.16 (2000-01). Accordingly, fulfilling the demand for food and employment opportunities is emerging as a key element/concern for the policy makers.

It is evident from the above perspectives that sustainable increase of food-grain, tracing out employment opportunities by exploring agri-business enterprises, natural resource management, etc are assumed prime importance for which research mandate may be set up.

Natural Resource and Climate Change :

Deteriorating soil and water quality, and emerging scarcity of fresh water resources are major sources of concern for sustainable agricultural development. Climate change is another

concern which has gained prominence in recent years as it impacts both agricultural production and its stability. Interestingly, though agriculture is viewed as a part of the climate change problem, it can also be a part of its solution. Effective technologies and management can reduce greenhouse gas emissions and mitigate the change impacts. Equally important from the rural livelihoods view point is enabling farmers and agribusinesses gain economic benefits of climate mitigation resulting from better management through instruments like carbon trading, etc., which are now available.

Technology Management :

In the liberalized economic scenario, the flow of products from new technologies into national markets will take place irrespective of national public investments in research in these areas. The emerging sciences and technologies like biotechnology, nanoscience and nanotechnology, information and communication technologies, food science and technology, and systems biology radically change the conceptual framework of managing agricultural production systems. These developments, when complemented with knowledge from conventional agricultural research and careful targeting of research, hold the key to ensuring sustainable productivity and livelihoods enhancements. Of particular current interest are the emerging nanotechnologies that hold promise in the agricultural and food sectors, as well as in managing the environment.

Knowledge Management:

Knowledge is an increasingly significant factor of production in modern agriculture. Every activity in the agricultural supply chain involves the creation, processing and communication of information. Timely access to information can add value at each link of the agricultural supply chain. Information and communication technologies (ICTs) can facilitate efficient data, information and knowledge flows across the supply chain. Innovative initiatives in ICTs in agriculture in the public, private and non- government sectors are underway in India. Key issues such as feasibility, scalability, sustainability, and overall impact are being addressed. Equally important is to enable smallholder access to ICTs and through them to a wide range of support systems and institutions for inputs, credit, expert knowledge, scaling, value addition and impact. New developments in bandwidth for connectivity and cloud computing, farmer access to mobile technologies, rising use of social networking tools, spread of precision agriculture, and increasing links among farmers and local and global markets emphasize the value of access to timely knowledge flows across the agricultural supply chain.

Livestock Potential :

With the exponential increase in population, global food demand is ever increasing and expected to be doubled by the year 2050 while the agricultural productivity is decelerating, largely due to shrinking of resources. Under such a backdrop, livestock sector can play a pivotal role to fulfill growing food demand in terms of nutritional security and employment generation. The livestock sector has emerged as one of the key components of agricultural growth in developing countries. It also plays a critical role in the socio-economic development and welfare of India's rural population not only as a source of food (milk, meat and egg) but also draught power, manure, hides etc. The Indian livestock sector is the endeavor of small holders and is a centuries old tradition and over 70% of rural households depend upon livestock farming for supplementary income. This sector is highly gender sensitive and about 90% of the activities related to care and management of livestock are carried by family's women folk. As a result of gradual transition from subsistence to market system, the economic dimensions of livestock keeping have gained significance. Animal husbandry sector provides large self employment opportunities and about 6.7% of work force in rural areas is engaged in this sector. The similar situation prevails in the six disadvantaged districts of West Bengal. West Bengal possesses 34542649 livestock which includes 11756690 goats, 1411049 sheep, 898831 pigs, 17984080 cattle, 875506 buffalo and 5114551 poultry (Livestock census, 2003). Total livestock population in West Bengal has decreased from 34877778 in 1994 to 34542649 in 2003 at the rate of 0.96%. In case of the six northern districts of West Bengal the average livestock population has decreased to the tune of 6.5% with respect to the base year 1994. The decreasing trend to the tune of 35.22 % is also found in case of average goat population in these northern districts. In contrast, the average pig, cattle, buffalo and poultry population have shown the increasing trend of growth to the tune of 26.83%, 12.04%, 28.37% and 31.55% respectively in the six northern districts of West Bengal. In such a gloomy situation there is a need to sustain the increasing growth trend of different animals and total livestock as a whole. Concerted efforts in terms of better health, feed and fodder availability and proper management are required to exploit this sector maximally to increase the growth rate of livestock population and overcome the future unemployment challenges.