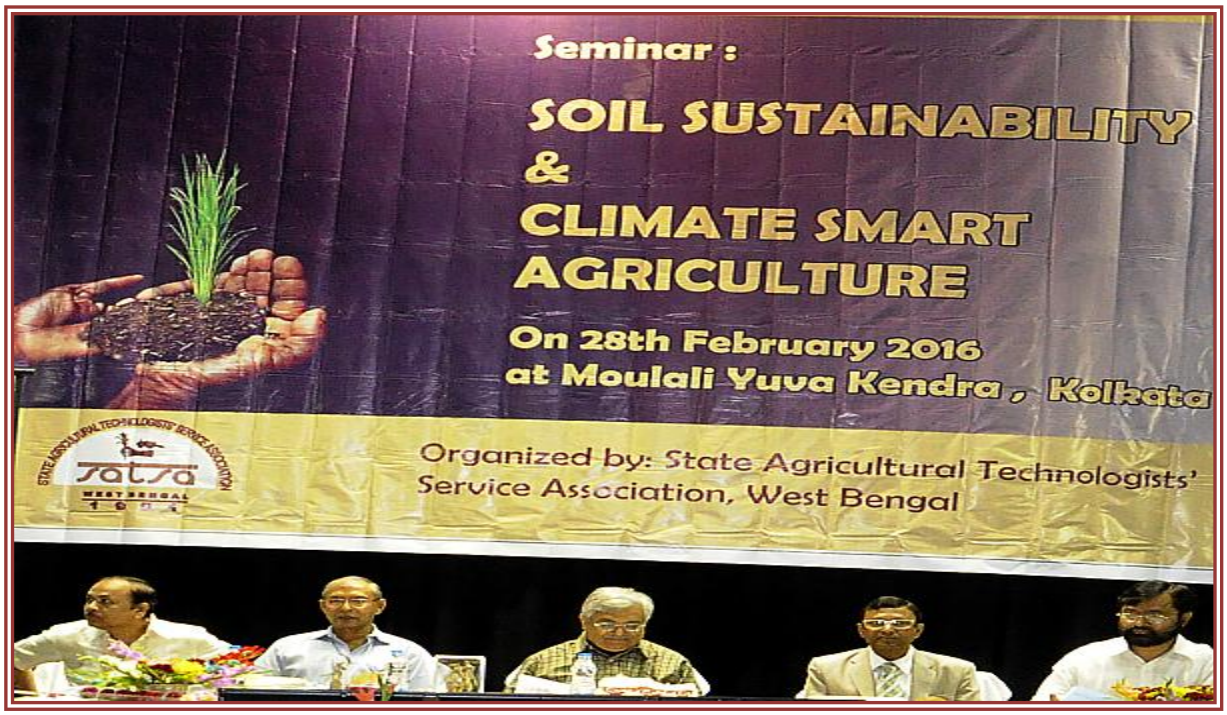
SESSION I



:Distinguished Guests:

Sri Pradip Majumdar; Advisor(Agriculture and Allied Sector);to the Hon'ble Chief Minister,West Bengal

Dr. Paritosh Bhattacharyya; OSD & Ex-Officio Director of Agriculture;West Bengal

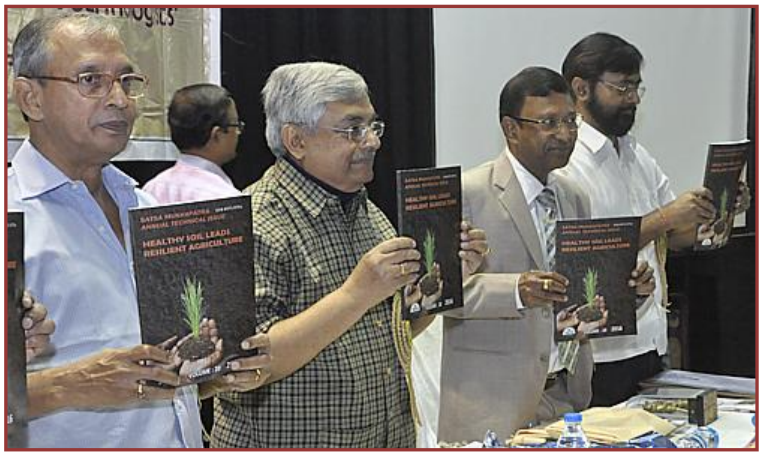
Prof. Chittaranjan Kole; Former Vice-Chancellor, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal and Dean, Jacob School of Biotechnology & Bioengineering, Allahabad Agricultural Institute, Uttar Pradesh

The guests were greeted by the President and the General Secretary of SATSA, WB

The program was inaugurated through lighting of ceremonial lamp by Sri Pradip Majumdar and other dignitaries.

Sri Murari Yadav, President; SATSA, West Bengal welcomed all dignitaries, speakers for the seminar; **Dr. Pradip Dey**, Principal Scientist (Soil Science) & Project Coordinator (STCR) ICAR- Indian Institute of Soil Science, Bhopal, Madhya Pradesh & **Dr. Pratap Bhattacharya**, Principal Scientist (Soil Science) ICAR-CRIJAF, Neelgunj, Barrackpore, West Bengal and members of SATSA,WB. Sri Yadav mentioned that West Bengal has been playing a leading role in agricultural development of the country which has been acknowledged by the GOI in form of Krishi Karman Award consecutively for four times. Farmers of West Bengal have been able to realise economic upliftment in terms of net income during the past few years. It is expected that, in the near future West Bengal would emerge as the 'Food Bowl' of India. But, according to him, the detrimental effect of loss in bio-diversity, depleting soil health, environmental pollution and erratic behavior of environmental parameters should be addressed with due importance. He concluded by saying that, this challenge ahead justified the topic of the day's seminar.

Sri Goutam Kumar Bhowmik; General Secretary, SATSA, West Bengal described the present scenario of agriculture in the state. The productivity has increased. The production of pulse and oilseed has gone up. Farmers have enjoyed an enhancement in net income by 75 per cent over the net income recorded during 2011. He expressed his satisfaction over the herculean task shouldered by the Agriculture Directorate during the last few years; enrolment of 69 lakh farmers under KCC, organizing Mati Utsab and Block Krishi Melas, prompt disbursement of input subsidy of 1020 crore rupees to 27 lakh farmers who faced crop loss due to natural calamity; were some of them. He recalled that, the state had experienced flood and drought within a period of 3 months; which substantiated the threat of weather aberration. He expressed pride that an Additional Chief Secretary has been leading the Department of Agriculture. Sri Bhowmik enlisted the expectations of the Association in brief-
allotment of schematic fund, at least the administrative approval, in due time; justified redistribution of 4 (four) posts of DDAs between Uttar and Dakshin Dinajpur; clarification of the status of WBAS(Admin.) officers of Alipurduar Sub-Division which has been upgraded to Alipuarduar District, promotion of WBAS(Research) officers etc. . He emphasized on the need of strengthening Seed Certification Wing by creating 20-25 WBAS posts instead of executing the huge responsibility by drafting Asstt.D.A.(Subject Matter) of Sub-Divisions as a temporary arrangement. He opined that the Directorate and WBSSC should establish proper coordination for timely distribution of quality inputs to the farmers. He concluded by stressing that, the long pending legitimate demand for 'Scale Linked Designation' should be fulfilled in acknowledgement of the sincere and efficient service provided by the officers of the Directorate.



Sri Pradip Majumdar; Advisor(Agriculture and Allied Sector) to the Hon'ble Chief Minister of West Bengal unveiled the **SATSA MUKHAPATRA, ANNUAL TECHNICAL ISSUE; Vol-20 titled - "Healthy Soil Leads Resilient Agriculture"**.

Dr. Paritosh Bhattacharyya; OSD & Ex-Officio Director of Agriculture West Bengal welcomed the newly appointed WBAS officers; a section of whom was present at the seminar as members of SATSA, WB. He appreciated SATSA for organising the seminar. He described the uniqueness of agriculture in the state as 96 per cent of farmers belong to marginal and small farmer category. Moreover, 92 percent of about 56 lakh hectare of arable land in the state remains under cultivation throughout the year; where the national average for the same is about 72 per cent. He gave an estimate that only 30 per cent of pulse requirement is produced within the state. Dr. Bhattacharyya set a target of 60 per cent for the same through bringing 8 lakh hectare of low land under 'Paira Farming'. He emphasized on Jute-Moong intercropping which, according to him, will be instrumental in meeting the pulse requirement as well as augmentation of farmers' income. He mentioned that there is also a potentiality of Maize-Pulse intercropping in North Bengal. He pointed out that though there had been a considerable rise in oilseed production, there is still a deficit of about 40 per cent of demand. He prescribed 'Toria' cultivation using residual moisture in Rabi season. Considering the erratic nature of rainfall both in terms of quantity and distribution, Dr. Bhattacharyya suggested use of SRI, Drum seeder and Aerobic rice cultivation technique to reduce water requirement in paddy cultivation and utilizing the excess water in cash crops. He informed that, 20-25 per cent reduction in water requirement has been estimated by using 'Zero-tillage' technique in paddy and wheat cultivation which is gaining popularity. He stressed on the need of maintenance of irrigation installations which currently provides irrigation water to 62 per cent of net sown area of the state. He suggested that, during preparation of District Irrigation Plan water requirement of rice should be changed to that required by water conserving technologies in lieu of usual 1400-1500 mm. He emphasised on the need of Soil Health card and training of farmers on its use. He expected that he would receive due cooperation from the Additional chief secretary of the department in establishing Bio-Control laboratory. He informed that E-tendering process has been completed for new Soil and Fertiliser Testing Laboratories. He expressed his satisfaction over the initiation of organic farming in the state. He informed that a project on Integrated Farming System has been launched in Balagarh of Hoogly District, where initial results obtained by using gobor gas plant, vermicompost and green manure have been inspiring. He stated that seed multiplication of flood and drought tolerant paddy varieties has been taken up and requested the Agriculture Universities to conduct research on developing such varieties of other crops.

Prof. Chittaranjan Kole , Dean, Jacob School of Biotechnology & Bioengineering, Allahabad Agricultural Institute, Uttar Pradesh assessed West Bengal as the leading agricultural state of India and praised for holding supreme position in some of the major crops. He suggested that, State Agriculture Department & Directorate, State Agriculture Universities and ICAR should work together for combating the future challenges. He also opined for establishing a Farmers' Academy and Convention Center which would be a platform for the farmers for discussing their problems and priorities. He thanked SATSA for organising a seminar on one of the major issues of the time.

Sri Pradip Majumdar; Advisor (Agriculture and Allied Sector) to the Hon'ble Chief Minister, West Bengal briefly discussed the perspective of establishment of Department of Agriculture and opening of service opportunities for agricultural technologists. He criticised the engagement of agricultural technologists in collecting levy from rice mills in the initial stages which according to him was a major contradiction to what should have been the role of a technologist as an extension functionary. He strongly uttered that the department should emerge as the most dependable service sector for the farmers of the state. He stressed on prioritising the targets and regular assessment of the achievements. According to him development of agriculture should necessarily target socio-economic upliftment of the farmers. For that, he opined, crop diversification and production enhancement planning should be based on demand of the market and post harvest processing should be given due importance. Agriculture extension work in the state has gained a new impetus through organizing Demonstration Center in renovated form, Krishi Melas at blocks and Mati Utsab at the state level. He highly esteemed the effort of the officers of the Directorate for the unprecedented promptness in distributing input subsidyto the farmers under SDRF. He asked for a comprehensive report on operational bottlenecks existing in department. He whole heartedly supported the proposal of Prof. Chittaranjan Kole for establishing a Farmers' Academy and Convention Center in the state. He concluded by praising SATSA for organizing the seminar.

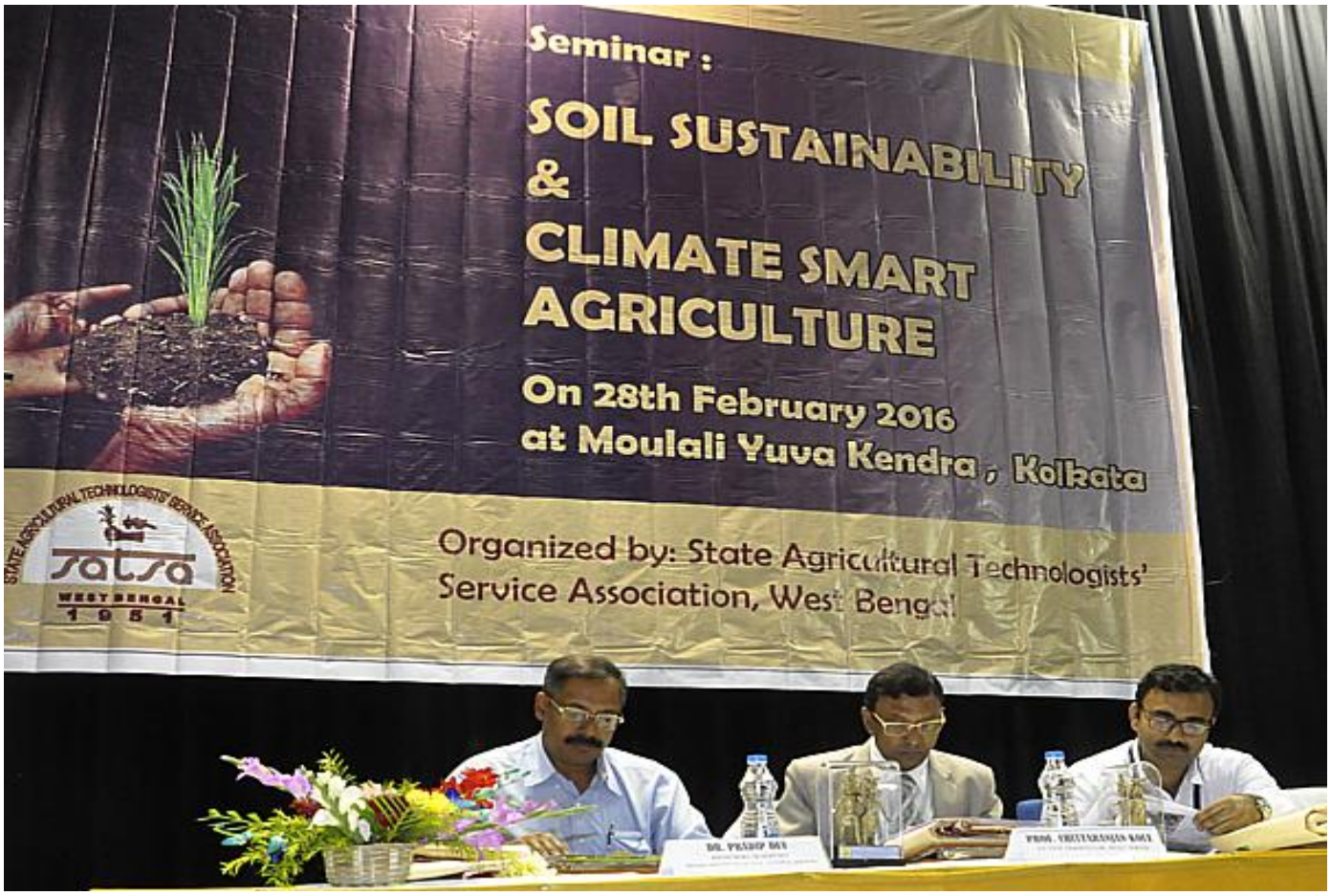
The session was suitably anchored by

Smt Anita Roy Chowdhury and

Sri Biswajit Mandal ;

member of SATSA, West Bengal.

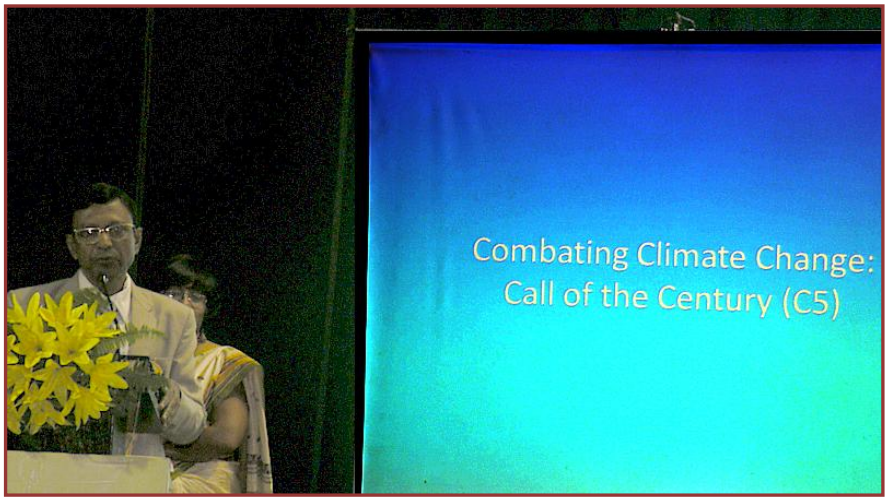
SESSION II



CHAIRMAN: **Prof. Chittaranjan Kole** , Former Vice-Chancellor, Bidhan Chandra Krishi Viswavidyalaya,Mohanpur, West Bengal and Dean, Jacob School of biotechnology & Bioengineering, Allahabad Agricultural Institute,UttarPradesh

SPEAKERS: 1. **Dr.Pradip Dey**, Principal Scientist (Soil Science) & Project Coordinator (STCR) ICAR- Indian Institute of Soil Science, Bhopal, Madhya Pradesh

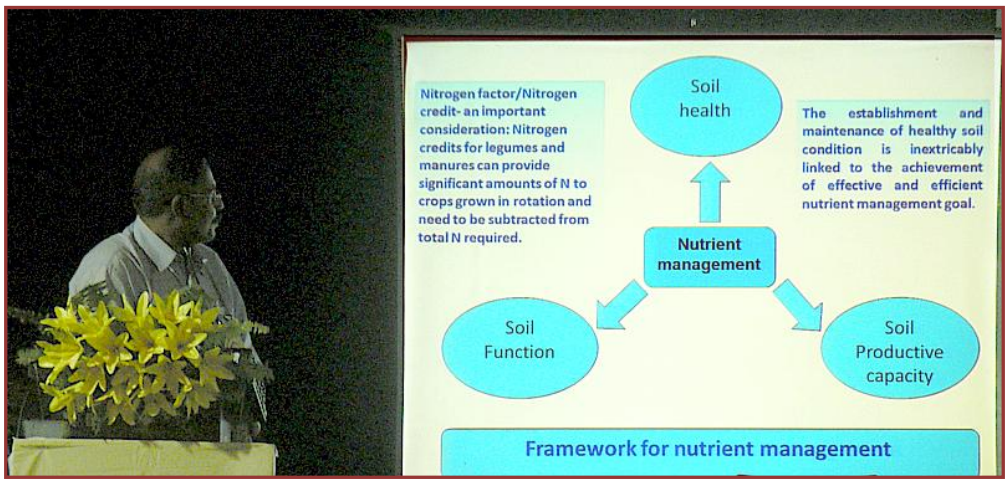
2. **Dr.Pratap Bhattacharya**, Principal Scientist (Soil Science) ICAR- Central Research Institute for Jute & Allied Fibres, Neelgunj, Barrackpore, W.Bengal



Prof. C.R. Kole commenced his address with a dictum that "Combating climate change is call of the century". He drew attention to the drastic alteration in the factors that influence agriculture and civilization like; temperature, rainfall, natural disaster, pathogens, insect population, soil nutrients, water, greenhouse emissions, pollinators etc. He expressed his concern over the unpredictable nature of the changes taking place and the nature of interaction between the factors. He also expressed his worries as West Bengal is already facing the vagaries of nature; in the form of flood in some parts and

drought in other parts of the State. He opined that, utilisation of available diverse bioresources and biotools might be the key to combat the situation. He mentioned a list of biotools like; allele mining, gene pyramiding and stacking, association mapping and fast track breeding, bioremediation, biofortification, biopharming. He also stressed on the use of nanotechnology in agriculture like; nanoformulations, nanosensor and nanogenics. Prof. Kole prioritized the importance of FNEE Security- security of food, nutrition, energy and environment. He also mentioned the possibility of shifting of a considerable agricultural land to biofuel crops which certainly aggravate the challenge of maintaining a balance between population and food production.

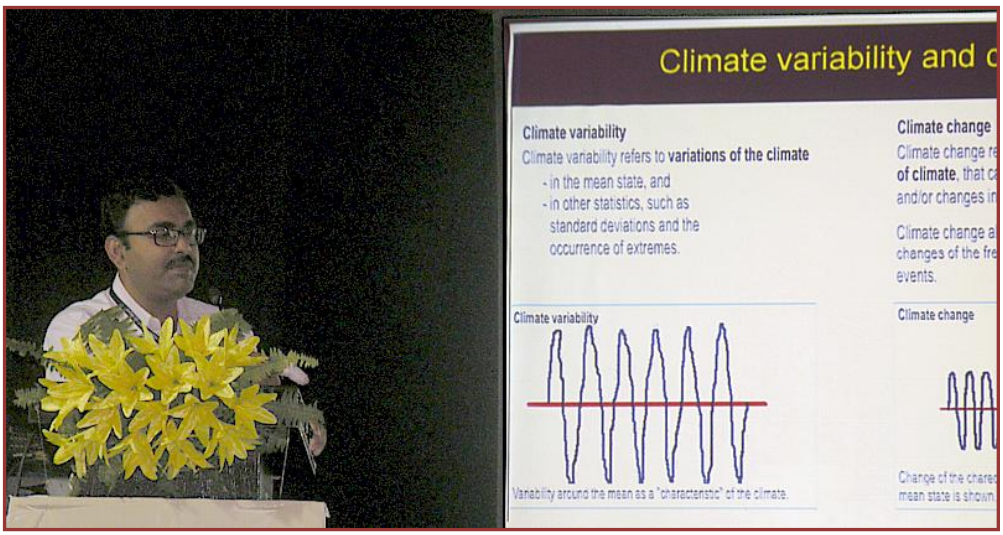
Dr. Pradip Dey spoke in favour of "Climate Resilient Soil Management Strategies". He said that, over the past few years there had been a paradigm shift; from food security to food – nutrition-environment security. Farming system should also change in tune; from productivity targeted planning to productivity-soil health-nutritional &environmental security targeted strategies. He also mentioned that, in the next fifteen years fifty per cent of the population will settle in urban areas and there will be a marked shift in their food habits. The national per capita land holding has been estimated to decline from 1.13 Ha to 0.96 Ha by 2020. He forecast some challenges to be faced in near future- declining soil nutrient response, declining organic matter status of soil, declining per capita water availability (the scarcity point has already been reached), decline in quality of water available for farming etc. Regarding management of soil health he stressed on the need of enhancing soil organic carbon through carbon sequestration (carbon trapping) which has positive effect on soil quality, sustenance and improvement in food production, maintenance of clean water and reduction of CO_2 in atmosphere. He furnished a list of measures for increasing SOC like; in situ moisture conservation through inter-row water harvesting, field bunding, mulching, deep ploughing ; following proper sowing time, balanced fertilization, use of sprinklers and drip methods particularly on undulating topography. Adoption of agro-forestry system with livestock management reduces risk of farming on one hand and improves soil carbon sequestration on the other. He conveyed that carbon sequestration is considered as one of the remedial measures to arrest climate change. Expressing his view on the issue of balanced fertilization; he referred to the ICAR project on Soil Test Crop Response (AICRP-STCR) which aims at developing a relationship between crop yield, soil test estimates and fertilizer inputs. He opined that, nutrient management should address soil health issues and for that there is a need to develop a STCR-IPNS approach in fertilization. The dressing schedule are being developed for different crops taking into consideration the targeted yield and nutrient



requirement of a crop at different stages. He also asserted on the use of customized fertilizers and nano plant nutrient products. He also stressed on fine tuning indigenous technical knowledge to suit modern needs. Dr. Dey cautioned that soil resilience; the ability of soil to bounce back to its original capacity, is not achievable without proper intervention. He emphasized on the need of a Soil Health Policy.

Dr. Pradip Dey concluded by saying that, judicious use of resources in mitigating the challenge of low carbon transformation and adopting strategies for enhancing carbon sequestration and maintaining soil health will help in combating climate change without compromising economic development.

Dr.Pratap Bhattacharya titled his speech as "New Age Research on Climate Resilient Agriculture and Way Forward". As a foreword he explained that **climate variability** is the shift of weather parameters from their mean value whereas **climate change** reefers to a consistent change in that variability over a period of time. He also drew attention to the recorded variations in the weather parameters: - increase in atmospheric carbon concentration (presently 400 ppm on an average), increase in temperature (July 2015 being the hottest month of the hottest year), rise in mean sea level (@ 3mm/year) and increase in number of hot days are some of them. These changes have directly affected crop production , positively in case of groundnut but the effect has been negative on some of the principal crops like; paddy, wheat and potato. As per his view farming of North India and Rabi Season will be most adversely affected due to climate change. In West Bengal the change in climatic parameters is equally alarming. Over the years there has been a marked increase in maximum temperature, total rainfall has not changed much but the intensity and variability in distribution of rainfall are becoming a matter of concern, onset and withdrawal of monsoon are shifting, Rabi season has shortened. Dr. Bhattacharya attributed the changes to the increase in Methane, Nitrous oxide and Carbon di-oxide gases; major player being the first two. Contradicting the general perception, he mentioned that rice cultivation does not produce any methane gas, but its agronomic practices and aerodynamics jointly provide a channel for entrapped methane to escape to the atmosphere. The major sources of methane are burning of residue and the ruminants while nitrous oxide is produced from decomposition of nitrogenous fertilizers and faulty manure management practices. He estimated that, agriculture contributes 29 per cent of green house gases and India produces lesser greenhouse gases than the foremost countries of the world.



He also pointed out that over the last 100 years there has been a rise in nitrous oxide emission but methane emission has remained static.

Before speaking on mitigation aspect, Dr. Bhattacharya opined that, the poor farmers and Sundarban are the most vulnerable section of population and region respectively, to climate change. He admitted that mitigation is very difficult. So, mitigation measures in collaboration with adaptation strategies might be the key for development of Resilient Agriculture. He referred to the four modules under National Innovations in Climate Resilient Agriculture (NICRA). **A) Crop Production Systems:** Use of drought or flood tolerant and photo-insensitive varieties of crops, resource conservation technologies, water saving paddy cultivation(aerobic paddy cultivation, SRI and direct seeded rice), improved nutrient management (following - right products, right rate, right time, right placement and right method). He also advocated for brown-manuring in paddy and use of cono-weeder, contingency cropping, crop diversification and community nursery in a staggered way using different varieties. **B) Natural Resource Management:** In-situ moisture conservation, plastic mulching, crop-residue recycling, rain water harvesting (ex-situ) and recycling in form of community storage tank, recharging wells and tube-wells, use of Jalkund (3 X 4 metre polythene lined structure) in hilly areas for seepage harvesting and use of water saving irrigation techniques. **C) Livestock and Fisheries Production System:** Integrated farming, introduction of stress tolerant breeds, fodder production, preventive vaccination, use of improved feed and mineral nutrition, improved shelter and innovative pisiculture. **D)Institutional Interventios:** Establishment of Village Climate Risk Management Committee (VCRMC), Custom Hiring Center for implements and machineries, Seed Bank, Fodder Bank,Commodity Groups, Collective Marketing, introduction of weather index based insurance and climate advisory services using data from weather stations. Dr. Bhattacharya also emphasized on the need of region specific crop calendar based on stage wise requirement of rainfall and other weather parameters.

Dr. Pratap Bhattacharya concluded by asserting that, future agricultural growth must be environmental friendly, which calls for improved resource use efficiency, adoption of best management practices and minimizing post-harvest losses.

After a brief summing up the Chairman for the Seminar, Prof. C.R. Kole invited the house for discussion. A lively interaction session followed, with several pertinent questions being raised by the audience. Answering to a question on shifting from C3 to C4 crops in view of increasing carbon concentration, speakers replied that up to 650 ppm paddy will show

positive yield response, but around and above 700 ppm switching over to C4 crops like maize, sugarcane might be beneficial, which obviously would be challenging in predominantly rice based system. In reply to a question on calibration of optimum dose of fertilizer and simultaneous use of inorganic and biofertilisers, the experts conveyed that, the issue of compatibility obviously is vital and it has been found that supplementary dose of P can be used with PSB while 80Kg of N per hectare may be used with rhizobium for soyabean cultivation while the dose should not be more than 20Kg per hectare for other legumes. Explaining the effectiveness of a single 'targeted yield equation', the experts clearly stated that crop wise and region wise fine tuning of the equation is a must for effective implementation. CEC of the soil should be a major consideration for developing the equation for a region. It was conveyed by the speakers that introduction of short duration varieties and early plantation/ sowing might be helpful in mitigating the problem of shortened Rabi season. The speakers stressed on water management for reducing carbon monoxide emission from crop fields. The house was informed that Soil Test Kit for testing 15 soil parameters has been developed. In reply to the queries the speakers suggested to use Rotavators once in three years and according to them herbicide use has become obvious for reducing labour cost in weeding but timely application of herbicide has to be assured for increasing efficacy. Bailing out Sahabhagi Rice Variety from the criticism of being too thermo sensitive, the experts asserted on its use as 'direct seeded rice' only in lieu of transplanted rice. In reply to a query on toxicity issue related to customised fertilizer the house was assured that a particular customized fertilizer is allowed for a maximum of three years of continuous use. After three years it is mandatory on the part of the manufacturer to conduct soil test and fertility evaluation of the concerned area and come up with a suitable formulation accordingly.

The seminar was concluded with vote of thanks by Shri Goshto Nayban; Jt.Secy, Press & Publicity, SATSA,West Bengal on behalf of the organisers.