EDITORIAL

Few Innovative Findings in Plant and Crop Science

Ratikanta Maiti*

Universidad Autonoma de Nuevo Leon, Facultad de Ciencias Forestales, Carr. Nac. No. 85 Km. 45, Linares, Nuevo Leon (67 700), Mexico

COLUMN

Correspondence to

**E-mail*: ratikanta.maiti@gmail.com

During last 50 years of research and teaching periods Prof. R.K. Maiti published more than 450 research papers and 42 books (available in R. K. M. Foundation library) in various disciplines of plant and crop science. Out of which he described a brief outline of few innovative research findings. Few hypotheses are put forward and research needs are suggested. (for details contact ratikanta.maiti@gmail.com)

1. Fibre Structure and Fibre Quality

Sufficient researches have been undertaken on botany, fibre yield and fibre quality of bast fibre crops such as jute (*Corchorus olitorius, C. capasularis),* kenaf (*Hibiscus cannabinus, H. sabdarifa*) and others. There exists a large variability in anatomical structure of fibre filaments among different fibre crop species and among varieties, which could be related to the fibre yield and quality. Recent research results have suggested that fibre anatomical structure could be used as selection criteria for genetic improvement of yield and quality. Further research is needed to confirm this.

2. Glossy Sorghum and its Role in Biotic and Abiotic Stress Resistance

Sorghum germplasms at the seedling stage can be distinguished as glossy with yellow green and stiff narrow erect leaves, while non-glossy having deepgreen and broad leaves. Sufficient research results have confirmed that glossy sorghum with non-glandular trichomes are tolerant to shoot fly (*Atherigona socatta* Rond*)* which migrate through collar and kills shoot meristem. Trichome and glossinesss hinders the migration of shoot fly larva. It has been confirmed that trichome intensity and glossy intensity is negatively correlated with shoot fly tolerance. Out of 18000 germplasms, we selected only 500 glossy sorghum while working at ICRISAT. At present, glossiness is considered as useful tool in screening cultivars for shoot fly tolerance. Concerted research inputs need to be directed in this endavour. It is further observed that glossy sorghum genotypes are tolerant to drought and salinity and adapted to low phosphate soil. Few researches have been directed in this direction.

3. Mechanism of Resistance to Striga, a Root Parasite in Sorghum

It is observed that sorghum cultivar tolerant to Striga produces extra sclerenchyma band just below the *Striga* haustoria, thereby impeding the entrance of haustoria to vascular bundle. In addition, the tolerant cultivar produces chemical exudates which could be toxic to Striga, The paper published in Annals of Botany is enormously cited by many authors.

4. Potential of Tropical Pearl Millet (*Pennisetum glaucum*) for Forage and Grain in Mexico

Various research inputs directed in tropical pearl millet introduced in Mexico have revealed that pear millet is much higher yielder both for forage and grain when compared to India. The plant height which was originally 1½ m height in India grew to 2½ m height and longer panicle. It is reported that the main reason of greater yield in Mexico was due to longer day length (16 h) and cooler nigh (25 °C) in Mexico compared to that in India. Paper published in Experimental Journal of Botany.

5. Low Cost Technology for Screening Crop Cultivars for Abiotic Stresses

Though significant progress has been attained in increasing productivity under high input situations, but little progress has been achieved in low input situation. We have selected simple low cost technology for screening and selecting crop

cultivars for few abiotic stresses such as salinity, drought, heat stress, flooding. In place of germplasm, we used high yielding/ pipeline cultivars for screening. Using this technology in India, we selected few field and vegetable crops for tolerance to salinity and drought. For example in the case of cotton, sunflower, the cultivars selected for salinity tolerance in the laboratory are found to be adapted to saline soil. This shows the transfer of technology from lab. to land We also identified few morpho-anatomical traits related to drought resistance in cotton. We suggest that salt and drought resistant crop cultivars could improve crop yield under saline and drought prone areas respectively.

6. Modified Priming Technique for Enhancing Flowering and Increasing Yield of Major Vegetable Crops

We developed simple modified priming technique which enhanced flowering and productivity of major vegetable crops such as chilli, tomato, bitter gourd, water melon and cucurbits. We recommend to use this potential technique to increase crop productivity of vegetable crops.

7. Wild Chilli, Chile piquin (*Capsicum annuum* var avilare)

Chile piquín is wild chilli grown in Mexico and is high commercial, export and medicinal values and high demand in foreign countries which is collected from wild habitats. We developed a novel technique to break seed dormancy and induce seed germination. This involves keeping the seeds mixed with the extracts of cow dung in refrigerator at 4 °C for seven days and then sowing the seeds in pots. This technique is highly innovative. We also analyzed chemical composition of chile piquin.

8. Germination and Propagation of *Cactus* Spp.

We developed novel technique to induce germination of more than 40 species of *Cactus.* It is assessed that cactus seeds requires sixteen hours of light period sown on soil surface with continuous supply of moisture to induce germination with more than 90% germination. This technique is used in the propagation of *Cactus* spp. in a green house in Pueba, Mexico.

9. Adaptive Strategy of Woody Species of Tamaulipan Thorn Scrub in Northeastern Mexico in Xeric Environments

During more than three years, various research inputs have been directed on experimental biology of woody trees and shrubs in xeric environments of Northeastern Mexico. The woody species were exposed to high summer temperature rising up to 45 °C and winter temperature going below 3 °C. Few morpho-physiological traits contributing to the adaptation of the woody species to xeric environments are mentioned below.

It is assumed that some morpho-anatomical and ecophysiological traits contribute to the adaptation of the woody species to xeric environment, among which branching pattern, branching density, few anatomical traits and ecophysiological traits. Many species show the absence of stomata or few stomata on the adaxial surface, besides the presence of sunken stomata and trichomes which reduce loss of transpiration and maintain water budget. It may be mentioned here that many tree species possess narrow vessels which are documented to act against cavitation in hot summer in Coastal Mediterranean regions.

Branching pattern and density act as solar panel for the capture of solar radiation, thereby reducing high temperature leading to the production of carbon. Many species possesses waxy leaves owing to the presence of epicuticular wax which help in reflection of radiation thereby reducing leaf temperature and imparting drought resistance. Besides, woody species show a large variability in macro and micronutrients in the leaves. The species having high leaf nutrients are expected to adapt under xeric environments.

Studies reveal that woody species show a large variability in carbon sequestration. The species with high capacity of carbon sequestration are expected to be adapted to xeric environments for their capacity in carbon fixation, thereby reducing high temperature. The woody species selected with high carbon concentration were *Eugenia caryophyllata* 51.66%, *Litsea glauscensens* 51.34%, *Rhus virens* 50.35%, *Forestiera angustifolia* 49.47%, *Gochantia hypoleuca* 49.86%, *Forestiera angustifolia* 49.47%, *Pinus arizonica* 49.32%, *Cinnamomum verum* 49.34%, *Bumelia celastrina* 49.25%, *Tecoma stans* 48.79%, *Acacia rigidula* 48.23%, *Eryobotria japonica* 47.98%, *Rosamarinus officinalis* 47.77%. Few of these species may be selected for plantation in highly carbon dioxide polluted areas in cities, road sides and factory areas with high emisssion of carbon dioxide.

