

# "C<sub>4</sub> Rice Towards food security under changing climate"

## REPORT

The cultivation of Rice has been started from the early civilization at the bank of the river. The wild rice varieties were cultivated by the early human beings which solved the problem of food demand of that age.

With advancement of age population and urbanization increases, cultivated land gradually decreases and food demand increases. So hybridisation process starts by the plant breeders to develop new varieties of Rice plant. These varieties increase the food productivity and meet the food scarcity. Industrialisation and deforestation gradually changes the early climate and sustainable development become a challenge to us.

Erratic monsoon, Natural disaster and increase in green house gases C<sub>3</sub> Rice plant (Family Poaceae) needs physiological, anatomical and genetical exchanges so as to adopt under changing climate.

It is well established that a carbon concentrating mechanism occurs in some terrestrial plants through the process of C<sub>4</sub> photosynthesis. These plants are characterized as having kranz- type anatomy, with two structurally and biochemically specialized photosynthetic cell types, mesophyll and bundle-sheath, that function co-ordinately in carbon assimilation.

C<sub>4</sub> photosynthesis has evolved independently many times with great diversity in forms of kranz anatomy, structure of dimorphic chloroplast and biochemistry of the C<sub>4</sub> cycle.

The most dramatic variants of  $C_4$  terrestrial plants were discovered recently in two species, *Binertia cycloptera* and *Borszczoaria aralocaspica* (Family *chenopodiacea*), each has novel compartmentation to accomplish  $C_4$  photosynthesis within a single chlorenchyma cell. Subsegment microscopic, biochemical and physiological studies have shown these species to function as  $C_4$  plants.

Now these characters are transferred to Rice plant by Recombinant D-N-A Technology so that Rice plant become a transgenic plant having ability to perform  $C_4$  and  $C_3$  cycle together under changing elimte. The process of photorespiration which is a characteristics feature during mid day due to activity of enzyme. The phosphogly collate mechanism of Rice plant is now changed by adopting glycolate mechanism of E-coli.

- The development of these characters in  $C_3$  Rice plants, a new  $C_4$  Rice plants are developed to adopt the changing elimte so that the productivity of Rice has increased markedly which make us substainability and food security.

