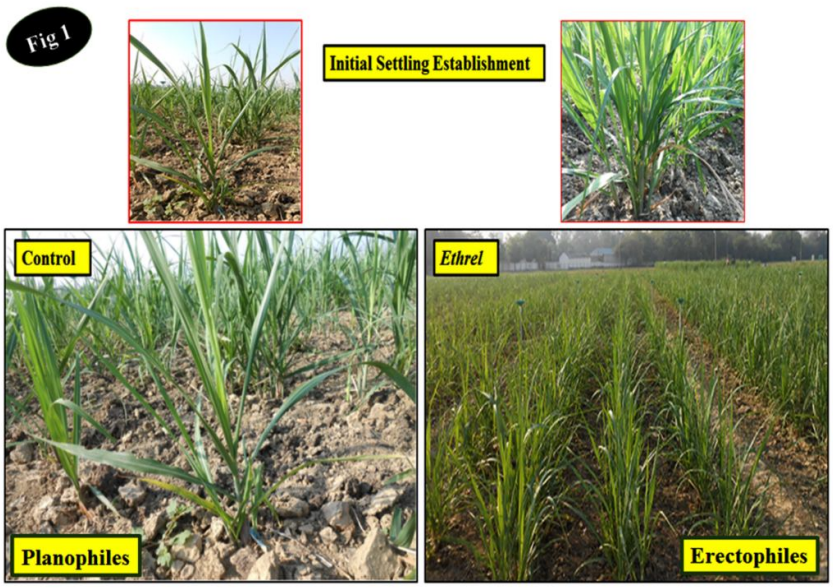
Success Story

Architectural Alterations through PGRs for Increased Cane Yield

Plant growth hormones (usage of *Ethrel*and GA_3) have potentially improved the sett vigour, enhanced its ability to sprout and established uniform and robust settlings in spring planted crop (**Fig 1**). Their usage led to significant alteration in leaf orientation (**Fig 2**), cane length (**Fig 3**) and root architecture (**Fig 4**). Architectural alterations caused faster heterotrophic to autotrophic transitions at planting stage (February). This induced high initial plant population (45 DAP), which was followed by induction of smart canopy with increased source activity, above and below ground sink development at 60 DAP. The formation of smart canopy was due to development of erectophiles (leaf angle 73^o) against planophiles (leaf angle 45^o) in control (**Fig 2**). Changes in leaf angle enabled added advantage of enhanced CO_2 utilization and radiation use efficiency. The GA_3 induced leaf orientation formed a smart canopy and improved dry matter partitioning. Further, leaf erectness also reduced the shading effects amongst the leaf present on a stalk, rendering increase in radiation use by lower leaf laminae of the stalk. GA_3 induced branched roots with steep angles (30^o), threefold increase in root weights and root hair development, sustained the nutrient requirement of increased shoot population. As a result, net assimilation rates [0.65 (cm^2 d^{-1})^2], leaf area ratio (16 cm^2 g^{-1}) and leaf area duration [55 (cm^2 d)10^4] enhanced, leading to increase in internodal numbers, length and their weight. At grand growth and harvest stage, a T_{max} 5.37 lakhs shoots ha^{-1} with NMC of3.01 lakhs ha^{-1} with *Ethrel*and GA_3 was obtained againstT_{max} 2.13 lakh shoots ha^{-1} in control with NMC of 1.32 lakhs shoots ha^{-1}. The application led to significant increase in cane yield of 255 tha^{-1} (per cane weight 847 g) against a cane yield of 84.69 tha^{-1} in control (per cane weight 640 g). The large accommodation of stalks in limited ground area with *Ethrel* and GA_3 is explained to be due to the development of smart canopies supported by a robust root system, where each plant occupied merely 331 cm^2 ground area against 800 cm^2 in control. The architectural alterations through PGR in sugarcane crop increased cane yield from 70-85 tha^{-1} to 255 tha^{-1} in spring planted sugarcane crop.

Sett Priming For Early and Higher Germination Percent



Overnight sett soaking in 100 ppm *Ethrel*

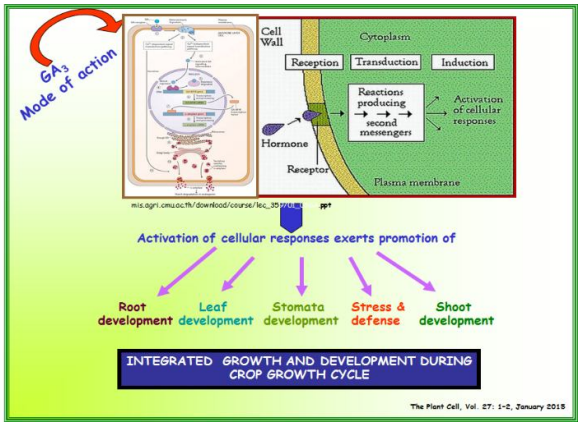
- Improves seed quality
- Early (20 days) & higher rate of bud germination (46 %)

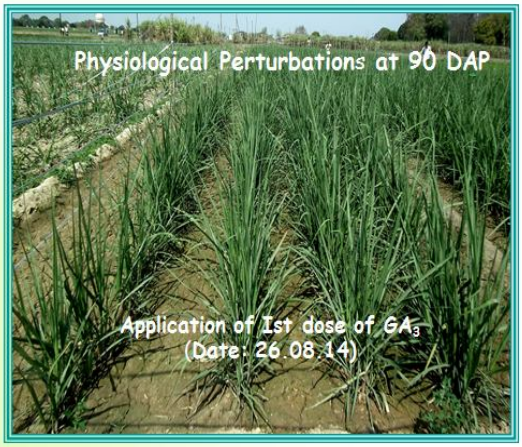
Fig 1: Uniform and robust settling establishment through *Ethrel*application in spring planted sugarcane

Foliar Application of GA_3 for Augmenting Cane Yield

Foliar application of GA_3 @ 35 ppm at 90, 120 & 150 DAP

- Early canopy coverage
- Increased shoot population





Altered Leaf Angles Impacting radiation use efficiency

Impact of GA_3Application on Canopy Coverage and Leaf Angles

Increased

internode length

impacting apparent free space for sucrose storage

Impact of GA_3 on Internode Architecture

Increased root biomass

Impacting water and nutrient use efficiency

Impact of GA_3 on Root Architecture

Increased NMC ha^{-1}& cane yield impacting farmers economy

Breaking yield barriers – Through robust shoot numbers and cane lengthalterations impacted by *Ethrel and* GA_3 in spring planted sugarcane

Field Impact Assessment

Growth Impact At 120 DAP

Vertical tiller growth maximizing radiation use efficiency for utilizing the photosynthates in inducing vertical growth of tillers, increasing the cane length and girth

Growth Impacts of Physiological Perturbations by spray after 150 DAP

Further Increase in internodal number, length, girth and cane weight

Crops Raised through Exogenous Applications of PGRs

Impact of GA_3 on Jaggery from Late Planted Crop