

1.6 TIGR2ESS: FieldCAM-Quant (FCQ)

Climate change negatively impacts food production requiring an urgent need to speed up and scale up the search for resilient crop varieties. TIGR²ESS researchers developed the FieldCAM-Quant (FCQ), a low-cost, open-source and mobile in-field device for rapid assessments of crop lines, with wider implications for global food security.

The challenges: Bringing a new crop variety to market demands labour-intensive processes requiring multiple measurements, ranging from height and biomass to flowering-times, to be made throughout the year. Drone technologies can perform rapid assessments in the field but they are costly and require a high level of technical expertise.

Travel restrictions during the COVID-19 pandemic saw a reduction in the availability of labour for agricultural fieldwork studies in India. TIGR²ESS researchers were faced with a stark choice between assessing fewer plant traits or assessing fewer varieties. The first choice gives a less accurate assessment, potentially resulting in the selection of poorer varieties. The second approach runs the risk of missing a high performing variety.

Developing accessible technologies: To address these scenarios, researchers at NIAB developed prototype FieldCAM-Quant (FCQ); a cheap, mobile tool that is easy to construct. Once assembled, image acquisition is a simple process using cameras controlled using a smartphone. Basic analysis can be carried out on the smartphone, giving instant readouts or enabling images to be stored and later analysed.

Precision and impact: While most visual measurements performed by humans are subjective the FCQ technology provides consistent measurements. Due to its low cost, open-source nature, the FCQ can be deployed in any location by someone with minimal training. A single worker will be able to assess more varieties in a day for more traits, increasing the capacity of those using the device and compensating for labour shortages.



Design of FieldCAM-Quant with example of conversion of original image into an image to be analysed and final output as a Leaf Area Index.

TIGR²ESS provided the opportunity for the NIAB team to develop and construct a prototype, which will be tested throughout 2022. It is envisaged that the FCQ will be constantly developed over the next 5-10 years by NIAB to meet the changing needs of agricultural research and development.

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