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Sorghum participatory varietal selection: a citizen science approach with tribal farmer communities in India

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Abstract

Citizen science has been advocated as a powerful tool to collectively develop and implement new technologies. The triadic comparison of technologies (tricot) approach is a recent application of this principle for participatory varietal selection. This methodology has shown to successfully accelerate the adoption of rice, wheat and bean varieties, as well as to identify environmental influences on the varieties’ adaptation.

In this contribution, we present a first application of the tricot approach for sorghum participatory varietal selection with tribal farmer communities in India. Our study included 200 farmers from 20 villages, located in the Adilabad District in the state of Telangana. Following the tricot methodology, each farmer blindly tested three sorghum varieties out of a total of six. The farmers were instructed to use the management practice of their choice to reflect the diversity of their growing conditions. At the end of the experiment, farmers were asked to rank the tested varieties from best to worst for traits such as pest and disease resistance, grain yield, and general appreciation. Specific statistical methods for ranking data were used to determine farmers’ variety preference.

We extended the tricot methodology by evaluating the influence of socio-economic background, environment, management practices, and culture on the varietal selection process. The farmers’ cultural values were measured using an adapted version of Hofstede’s Cultural Dimensions Scale. In parallel with the farmer trials in Adilabad, we also performed an on-station experiment with breeders, using the same design and methodology on a reduced number of plots.

The evaluation of the farmer data showed clear preferences for one to two sorghum varieties given the considered traits. Covariables like soil quality, type of farming (organic versus conventional), and cultural values, showed significant effects on the farmers’ choices, which represents a unique case to illustrate the complexity of factors influencing farmer varietal selection. The comparison of farmer results with breeder choices showed agreement about

the most suitable varieties, which provides a strong validation of the tricot methodology. Therefore, we showed the big potential of the tricot approach to address farmers' needs in this kind of complex context.

Keywords: Citizen science, crop adoption, culture, India, participatory varietal selection, socio-economics, sorghum, tribal farmers, tricot approach