



New cereal and legume technologies to underpin sustainable intensification in semi-arid agro-ecologies of central Tanzania

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Abstract

Africa RISING is undertaking research to support sustainable intensification of crop and livestock production systems. In semiarid agroecologies of Tanzania, the work is based in Kongwa and Kiteto districts. These agro-ecologies annually receive 400-700 mm of rainfall in one growing season; have limited access to improved technologies, with up to 51% of the population living below the poverty line. An integrated R&D approach that: (i) Tests individual technologies, (ii) validates integrated technology packages, and (iii) tests models for scaling, is being used to study resilience and productivity enhancement options for maize-legume based farming systems in the two districts. New technologies being evaluated include legumes: Groundnut (5 genotypes); Pigeonpea (6 genotypes) and cereals: Maize (55 QPM and 10 drought tolerant genotypes); Sorghum (20 genotypes); and Pearl millet, (20 genotypes). Both complete and incomplete block experimental designs are used as appropriate on-station and on-farm along with participatory variety selection done in five sites/villages. In general, all new groundnut genotypes out performed the local check with a 3-4 fold yield advantage. ICGV-SM 02724, the best groundnut line, produced >800 kg/ha presenting a 120% yield advantage. ICEAP 00932 a new pigeonpea variety, produced 1422 kg/ha compared to 1243 kg/ha and 1138 kg/ha for the older varieties ICEAPs 0040 and 00557 respectively), and a yield advantage of 156% over the local variety. The maize line T283-34 out-performed released QPM varieties LISHE2 and KILIMAH06, with a 2 fold yield advantage; Sorghum and pearl millet test lines produced up to 4 tons/ha and 3 tons/ha respectively, presenting a 3-4 fold yield advantage. In order to test models for scaling-up, an R&D framework involving a network of farmers and key value chain actors (Farmer Research Networks -FRN), is being used for learning and discovery. The FRN will elucidate the roles of cropping systems and socio-economic dynamics on adoption of improved dryland cereal and legume innovations. Sixty-five households from both districts in the first study and 40 households in the follow up study, from two villages in Kongwa- Moletti (moderately ecologically constrained) and Laikala (highly ecologically constrained) are involved. Preliminary results show that >33% of households manage farming risk through intercropping and livestock production. Access to markets (for inputs- seed and outputs- grain) and knowledge (agronomy) are most limiting drivers of adoption, whilst land is only limiting to one third of the population but its quality is an issue. Thus optimization of intercropping systems contextualized for farm typologies is needed to guide deployment of innovations at scale.

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