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with planetary health"

Intercropping for resilient and diversified agri-food systems in moisture-deficient areas of Ethiopia

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Abstract

Intercropping, the simultaneous cultivation of two or more crops, offers key benefits such as enhanced yield stability, improved food diversity, risk reduction, and greater climate resilience. This study evaluated the effects of sorghum–pulse intercropping arrangements on yield performance and land use efficiency in moisture-deficient areas of East and West Belesa, Ethiopia, during the 2017 cropping season. A randomised complete block design with nine treatments and three replications was used, including sole cropping of sorghum, mung bean, and haricot bean, as well as intercropping systems (sorghum–mung bean and sorghum–haricot bean) arranged in 1:1, 1:2, and 2:1 row ratios. The results showed that the maximum grain yield was obtained from both species in the sol cropping treatment. All intercropping results showed that the land equivalent ratios (LER) above one, indicating improved land use efficiency. The 1:1 sorghum–haricot bean intercropping system achieved the highest LER (1.54) and significant intercropping advantages (4601–4837). Additionally, the 1:1 sorghum–haricot bean combination showed a 31 % area time equivalent ratio (ATER) advantage, whereas 2:1 and 1:2 sorghum–mung bean treatments exhibited up to 95 % disadvantages. Economic analysis revealed that the 1:1 sorghum–haricot bean arrangement yielded the highest net benefit (35,967 Ethiopian Birr). Based on agronomic performance and economic viability, the 1:1 sorghum–haricot bean intercropping system is recommended to enhance the resilience and diversification of the agri-food system in moisture-deficient areas of East and West Belesa, Ethiopia, and similar agroecologies. These findings underscore the potential of optimised intercropping systems to improve productivity, resource efficiency, and food security in climate-vulnerable farming systems.

Keywords: Haricot bean, intercropping, LER, Moisture deficit, Mung bean, Sorghum

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