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Cultivation of Cowpea Challenges in West Africa for Food Security: Analysis of Factors Driving Yield Gap in Benin

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Abstract

Feeding the world in 2050 need to found the ways to boost yields of the main local crops. Among those crops, cowpea is one of the important grain legumes that is playing an important role in the livelihood of millions of people in West Africa, especially in Benin. Unfortunately, cowpea on-farm yields are very low. In order to understand the main factors explaining cowpea yield gaps, we collected and analysed detailed survey data from 298 cowpea fields in Benin during the 2017, 2018 and 2019 rainy seasons, respectively. Composite soil samples were collected from cowpea fields at flowering stage and analysed at laboratory. Data on-farm field management practices and field conditions were recorded through interviews with 606 farmers. Average cowpea grain yields were low and seldom surpassed 700 kg ha^{-1} on farmer's fields. Significant differences were observed between cowpea grain yields from northern to southern Benin ($p < 0.05$), and the lowest yields were observed in northern Benin. These low yields are related to crop management practices, soil nutrient contents, and the interaction of both. According to the model of regression tree from northern to southern Benin, mineral fertiliser used, insecticide sprays to control pests, and improvement of P, N, K, and cation sum content into top soil would increase cowpea grain yields. Insect pest, diseases, and soil fertility decline are the highest major constraints that limit cowpea cultivation in Benin. Future research should focus on formulating specific fertiliser for effective cowpea cultivation in Benin, as well as insect pest, and diseases control.

Keywords: Cowpea yield, crop management practices, food security, soil fertility