

EFFECT OF FERTILIZER APPLICATION ON CASSAVA AND MAIZE YIELD IN INTERCROPPING SYSTEM AT SIKKA DISTRICT, EAST NUSA TENGGARA

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INTRODUCTION

Cassava is the second important crop for East Nusa Tenggara people. It is one of the main diets for rural people. Therefore, cassava is found extensively in East Nusa Tenggara (mostly planted intercrop with maize), but the yield is very low (less than 10 t/ha). During RRA and house hold survey we observed that the reasons for low yield are: (1) low cassava density (1.250 to 2.500 plants/ha), (2) variety planted is low yield local variety with, and (3) no fertilizer application.

The previous agronomical trials have resulted in several key points for increasing cassava yield in East Nusa Tenggara. From the result of variety test, farmers very enthusiastic to plant the introduce variety, especially Gajah, Malang 4 and to some extend Faroka varieties. After learning from intercropping trials done in 2016, most farmers participated in the field day willing to increase their cassava population in their maize+ cassava farming. However, it should be noted that increasing crop yield would increase plant nutrient uptake. Therefore, fertilizer application is absolutely important, either to satisfy the shortage of plant nutrient or to maintain soil from degradation. Hence, the aim of the agronomical trial was to: (1) to investigate the effect of fertilizer application on the growth and yield of maize and cassava in cassava+maize intercropping in dry climate of East Nusa Tenggara; and (2) to demonstrated the East Nusa Tenggara farmers the importance of fertilization.

METDOS AND DESIGN

The fertilization trial was set up in the village of Wolohuler, Sikka Regency, East Nusa Tenggara – Indonesia. The treatments were:

- (1) Cropping systems (monoculture maize; intercropping maize with cassava at cassava spacing of 1 m x 1 m; intercropping maize with cassava at cassava spacing of 2 m x 1 m); and
- (2) Fertilizer application (nil; Nitrogen only, N; and Complete fertilizers, NPK).

The complete treatment combinations are shown in Table 1. These treatment combinations were arranged in a complete randomized block design with three replicates.

Planting was done on 23 November 2017. Maize, Bisi variety, was planted at a plant distance of 1 m x 0.30 m on a plot size of 6 m x 5 m. Cassava stem, of about 25 cm was planted in between maize row. All phosphate and potassium fertilizer were applied at planting date; Urea was applied 2 times for monoculture maize (each was half rate) and 3 times for maize+ cassava intercropping (each was 1/3rd rate). Weeding was done manually at 45 dap and after maize harvested. Maize was harvested on 9 March 2018, after which mungbean, a local variety, was planted at a plant distance of about 30 x 30 cm. Field day was done during harvesting maize intercrop, which was done on 9 March 2018.

Table 1. Complete treatment combinations

Code	Cropping System	Fertilizer
MFO	Maize Monoculture	Nil Fertilizer (control)
MN	Maize Monoculture	200 kg Urea (1 st at planting; 2 nd at 45 days after planting, dap)
MNPK	Maize Monoculture	200 kg Urea/ha (1 st at planting; 2 nd at 45 dap); 100 kg Superphosphate 36 (SP36) and 100 kg Potassium chloride (KCl) at planting
MC ₁ F0	Intercropping cassava-maize (2m x 1m)	Nil Fertilizer
MC ₁ N	Intercropping cassava-maize (2m x 1m)	300 kg Urea/ha (1 st at planting; 2 nd at 45 dap; 3 rd after maize harvested).
MC ₁ NPK	Intercropping cassava-maize (2m x 1m)	300 kg Urea/ha (1 st at planting; 2 nd at 45 dap; 3 rd after maize harvested). 100 kg SP 36 and 100 kg Potassium KCl at planting.
MC ₂ F0	Intercropping cassava-maize (1m x 1m)	Nil Fertilizer
MC ₂ N	Intercropping cassava-maize (1m x 1m)	300 kg Urea/ha (1 st at planting; 2 nd at 45 dap; 3 rd after maize harvested).
MC ₂ NPK	Intercropping cassava-maize (1m x 1m)	300 kg Urea/ha (1 st at planting; 2 nd at 45 dap; 3 rd after maize harvested). 100 kg SP36 and 100 kg KCl at planting.

Results.

The maize was harvested on 9th of March 2018, and the fertilizer treatments showed a significant influence on the maize yield ($P < 0.05$). There was no significant difference on maize yield between the monoculture and the intercropping system ($P > 0.05$) (Figure 1). The application of fertilizer, both as urea and NPK, was found to significantly increase the maize yield ($P < 0.05$), as expected. However, when comparing between urea and NPK, there was no significant effect of these different fertilizer application to the yield of maize.

The cassava was harvested on November 2018, the results is shown in Figure 2. There was significant influence of fertilizer (both Urea and NPK) application to the yield of cassava. The highest yield in this trial was obtained by the NPK fertilizer and in 1x1 plant spacing (47 ton/ha). The NPK fertilizer significantly increased the cassava yield.

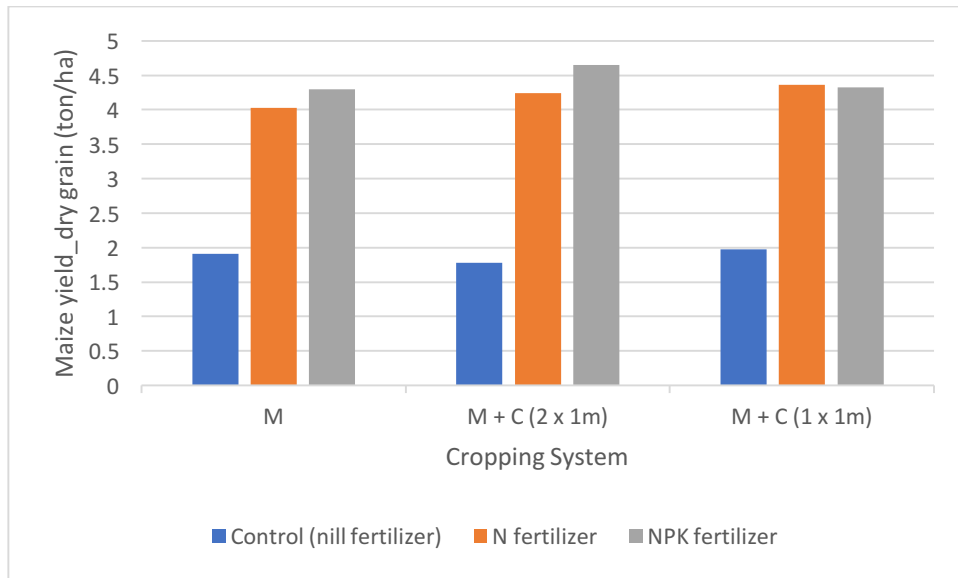


Figure 1. Maize Yield (ton/ha)

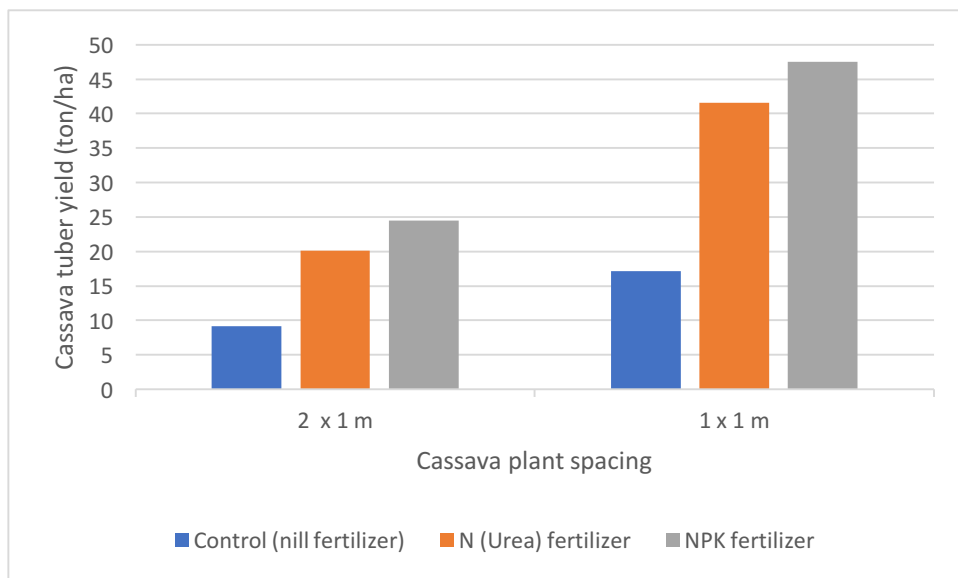


Figure 2. Cassava Yield (ton/ha)

Discussion and conclusion.

The main objective of this trial was to show the importance of fertilization in the cassava+maize intercropping system to the farmers in East Nusa Tenggara. The current practice of fertilization by farmers only applied fertilizer (usually in the form of NPK) to their maize crops, but not the cassava. After harvesting maize, farmers don't apply more fertilizer to the cassava crops. Hence, the results from this trial had shown to the farmers the effect of additional fertilization after harvesting maize. The cassava yield was doubled when fertilizer was added. During the field day, farmers are more than willing to adopt the fertilization recommendation from the UB-ILETRI team. However, since fertilizer in East Nusa Tenggara can only be obtained through government (agricultural extension officer) recommendation, thus farmers need to make a report of fertilizer purchase for their cassava crops. This will need a good collaboration between farmers group, agricultural extension officer and the governmental agencies to ensure the availability of fertilizer to the farmers. Further trial will be designed to obtain the appropriate dosage of N and K fertilizer to the farmers in East Nusa Tenggara.