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Fertilizer Micro-dosing and Timing of Weeding for Enhancing Finger-Millet Production in Eastern Uganda

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Abstract

Finger-millet response to micro-dosing with N and P fertilizer in the Semi-Arid areas of eastern Uganda is not fully known. Consequently, we conducted a field study at Kuju in eastern Uganda in 2016 long and short rains. The study determined the effect of fertilizer micro-dosing and weeding time on finger-millet performance. The experiment was laid out in a randomized complete block design with a split plot treatment structure. Weeding time constituted the main plot (weeding at 20, 30, 45 DAS (days after sowing) and 20 + 45 DAS while fertilizer rates (16.6 kg N ha^{-1} + 10.6 kg P_2O_5 ha^{-1}; 10.6 kg P_2O_5 ha^{-1}; 16.6 kg N ha^{-1}; 0 N + 0 N and 83 kg N ha^{-1} + 52 kg P_2O_5 ha^{-1}) constituted the sub-plots. Results of this study revealed that finger-millet grain yield was highest (2182 kg ha^{-1}) at fertilizer micro-dosing (16.6 kg N ha^{-1} + 10.6 kg P_2O_5 ha^{-1}) and lowest (950 kg ha^{-1}) in plots with no fertilizer. Fertilizer micro-dose application (16.6 kg N ha^{-1} + 10.6 kg P_2O_5 ha^{-1}) caused early flowering of finger-millet (52.2 days), whereas delayed flowering was recorded, where 16.6 kg N ha^{-1} (55.12 days) was applied. The interaction between time of weeding and fertilizer rates significantly ($P < 0.05$) increased finger millet growth and grain yield. The interaction of N and P fertilizer micro-dose with weeding once at 20 DAS had the highest finger-millet grain yield. Therefore, it is recommended that fertilizer micro-dosing can be used to enhance finger-millet productivity.

Keywords: full dose, fertilizer micro-dosing, days after sowing, timing of weeding

1. Introduction

Finger-millet (*Eleusine coracana* (L.) is a major food crop of the semi-arid tropics of Asia and Africa and fits well in dry land farming systems (Goron & Raizada, 2015). The crop was domesticated in the highlands of Ethiopia and Uganda approximately 5000 years ago, and today it is ranked fourth globally in importance, after sorghum, pearl millet, and foxtail millet (Das, 2013). It is cultivated in more than 25 countries, mainly in Africa and Asia (Chandrasekara & Shahidi, 2010).

In Uganda, finger-millet is rated second to maize (*Zea mays* L.) in importance among the cereals (Owere, Tongoona, Derera, & Wanyera, 2014). The crop is grown on an estimated area of 175,173 ha annually which provides grain harvests of up to 236,484 metric tonnes (UBOS, 2016). Production of the crop is largely in the northern, eastern and western regions of the country (UBOS, 2016). It is grown mainly as a staple food crop, but also contributes greatly to the incomes of rural households, particularly women. Finger-millet has a number of uses that include; it is brewed into local beer for sale, ground into flour for porridge and bread, and also sold directly as grain in local markets where there is ready demand (Ebanyat, 2009; Owere, 2013). In addition, finger-millet plays a major role in providing for the dietary needs and incomes of the rural people who constitute more than 80% of the Ugandan population.

However, finger-millet productivity (yield per unit area) is declining from 2,500-2,600 kg ha^{-1} (Kidoido, Kasenge, Mbowa, Tenywa, & Nyende, 2002; Owere, 2013; Wanyera, 2007). This has been attributed to; low soil fertility and weed proliferation, moisture stress, pests and diseases and poor agronomic practices (Ebanyat, 2009; Opole, Prasad, & Staggenborg, 2013). Nitrogen and phosphorous are the major limiting nutrients (Ebanyat, 2009; Owere,