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Optimisation of Seedball Technology for Pearl Millet (*Pennisetum glaucum*) Production in the Sahel

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Abstract

In the Sahel, pearl millet (*Pennisetum glaucum*) production is severely constrained as a result of the combined effects of erratic rainfall, poor soil fertility and resource scarcity on the seedlings' survival, most especially at the on-set of the farming season. This increases the bottleneck of labour acquisition for replanting and the production cost, and also keeps the female farmers away from partaking in the farming. However, the farmers practice dry planting, but this leads to crop failures due to the first low rain amounts (<10mm), seed predation and seed wastages at sowing as a result of inserting a vast and an unknown seed amounts in the planting pockets. The application of irrigation, mineral fertiliser and seed treatments as solutions to these problems require skills and are expensive, thus, cannot be afforded by the small scale farmers. In this study, we try to optimise 'seedball technology" in the context of small holder farmers. Seedball technology is a cheap and simple seed-pelleting technique that improves seedlings' survival using locally available resources (clay + sand + seed + water), with wood ash or NPK-mineral fertiliser as the nutrient additives, in a gravimetric mixture. The technology has an added advantage of controlling seed wastages and predation by using a known amount of seeds and seed encapsulation within the seedballs respectively. We conducted climate-chamber pot experiments (<40 days, 30°C temperature, 48.5 % humidity, sandy soil), using the different combinations of the local materials in a block-design of six replicates to optimise the mechanical (size) and chemical (nutrient concentration) effects of the seedball on the seedlings' emergence, nutrient contents (N, P, K, Ca and Mg) and physiology (shoot and root biomass) of pearl millet. We found significant differences in the root and shoot biomass, root and shoot length development, and nutrient contents. Seedballs of 1.5–2.0 cm diameter size, at 2–3 cm sowing depth have no negative effects on the seedlings' emergence. Ammonium and greater than 3 cm sowing depth inhibit seedlings emergence in seedballs. Seedballs have the potentials to relax the bottleneck of crop failures in the Sahel, and encourage more female farmers in pearl millet production.

Keywords: Local materials, pearl millet seedlings, seedball technology, seedballs, seedling establishment

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