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Influence of Moringa leaf extract and coconut water as priming agent to improves the emergence and early seedling growth in cucumber

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ABSTRACT:

Priming with plant growth regulators was widely reported in the literature to improve seedling vigor and emergence. The experiment was conducted to evaluate the effect of extract from moringa leaf and coconut water on emergence improvement and early seedling growth in cucumber by treating the seeds of cucumber for 18 hours in the aerated solution of Fresh Moringa Leaf Extract; (FMLE), Stored Moringa Leaf Extract; (SMLE) and Fresh Coconut Water; (FCW). Seed priming with extract from plant improved the emergence rate, uniformity and early seedling growth. However, seeds primed with FMLE were more effective in reducing the mean emergence time, improving the final emergence percentage, likewise the emergence energy and number of roots. However, highest fresh and dry weights, root length of seedling were recorded from seeds primed with fresh coconut water. Seeds primed with moringa leaf extract and/or coconut water can be successfully employed to increase germination and to improve seedling growth in cucumbers.

Keywords:

Cucumber; Moringa leaf extract; Coconut water; Seed priming.

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INTRODUCTION

Uniform emergence and rapid growth are very important prerequisites to increased yield, quality, and ultimately profits in annual crops production. Uniformity and percentage of seedling emergence of direct-seed crops have a major impact on the final yield and quality (Wurr and Fellows, 1983). High rate and uniformity in the emergence of seeds are inherent to seed quality and environmental conditions during seedling emergence. Priming of seeds is a tool employed in the reduction, from the time of sowing of seeds to the emergence of seedling (Parera and Cantliffe, 1994). Nelson and Govers, (1986) reported that delayed and reduced seedling emergence is the major setback to achieve uniform and vigorous crop stand in early spring planted cucumbers (*Cucumis sativus* L.). Moreover, erratic and non-uniform seedling emergence due to poor seed germination causes irregular plant growth and development, leading to low or poor marketability.

The use of natural growth regulators for priming and other pre-treatment methods for many crops have been reported to have an increase in the seed germination performance, which resulted in the general plant growth and high productivity of seedling even at adverse environmental conditions like extreme temperature, salinity etc. 'Among the different natural sources that are used to extract plant growth regulators, moringa

(*Moringa oleifera* L.) is gaining a lot of attraction (Foidl *et al.*, 2001)'.

Moringa oleifera L. leaves are rich in zeatin, a phytohormone that is involved primarily in the cell growth and differentiation. According to Foidl *et al.*, (2001), moringa leaf is also rich in ascorbates, carotenoids, phenols, potassium and calcium, which have plant growth promoting capabilities and often applied as an exogenous plant growth enhancers.

The coconut (*Cocos nucifera* L.) is an important tree of the tropics and its fruit is employed for the production of a variety of foods and beverages. The edible part of the coconut fruit (coconut meat and coconut water) is the endosperm tissue (Jean *et al* 2009). Coconut water is a natural and nutritional beverage that is beneficial to the human health, apart from the nutritional benefit to human health, the extensive use of coconut water as a growth-promoting component in tissue culture medium formulation can be traced back to more than half a century ago, when Overbeek *et al.* (1941) first introduced coconut water as a new component of the nutrient medium for callus culture in 1941, and coconut water also appeared to have growth regulatory properties, e.g., cytokinin-type activity (George and Sherrington 1984).

In view of these, the aim of this study is to evaluate the influence of extract from young Moringa leaf extract and Coconut water on germination and early seedling growth of cucumber.

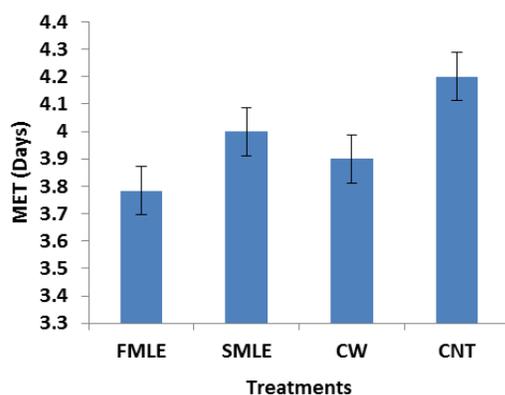


Figure 1. Influence of seed Priming on Mean Emergence Time \pm s.e. in Cucumber

MATERIALS AND METHODS

Seed materials:

Seed of cucumber, cv. Nabil, were obtained from Premier Seed Nigeria Limited. Zaria Kaduna State. Young leaves of moringa were collected from a mature tree and the juice was extracted, also fresh coconut was harvested from the mature tree and the water was extracted. Seeds were primed with fresh coconut water, fresh and one month stored Moringa Leaf Extract (MLE)

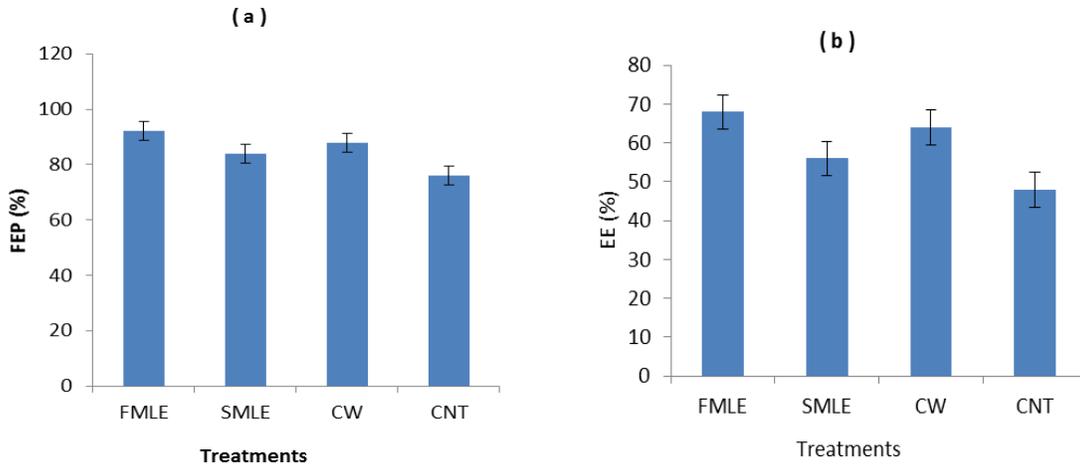


Figure 2. Influence of Seed Priming on (a) Final Emergence Percentage and (b) Emergence Energy (EE) \pm s.e. in cucumber

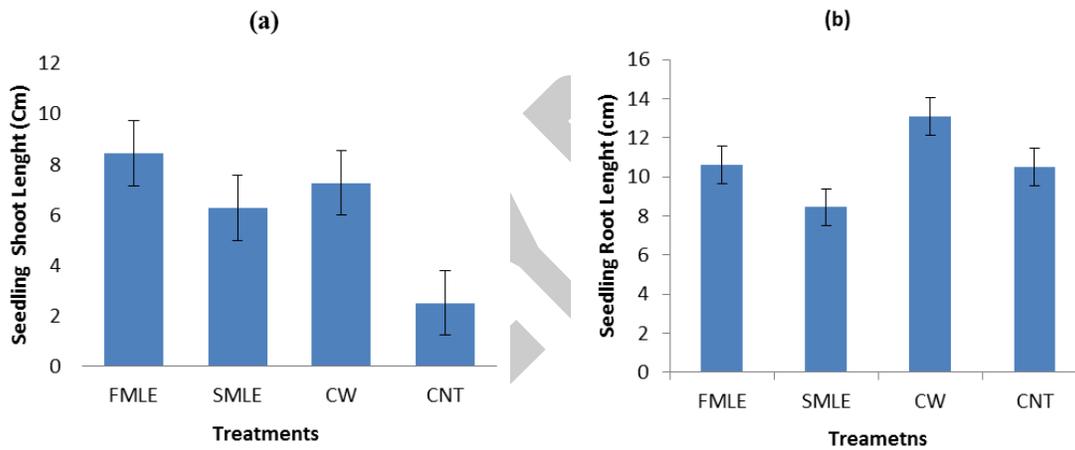


Figure 3. Influence of seed Priming on (a) shoot length and (b) root length \pm s.e. in Cucumber

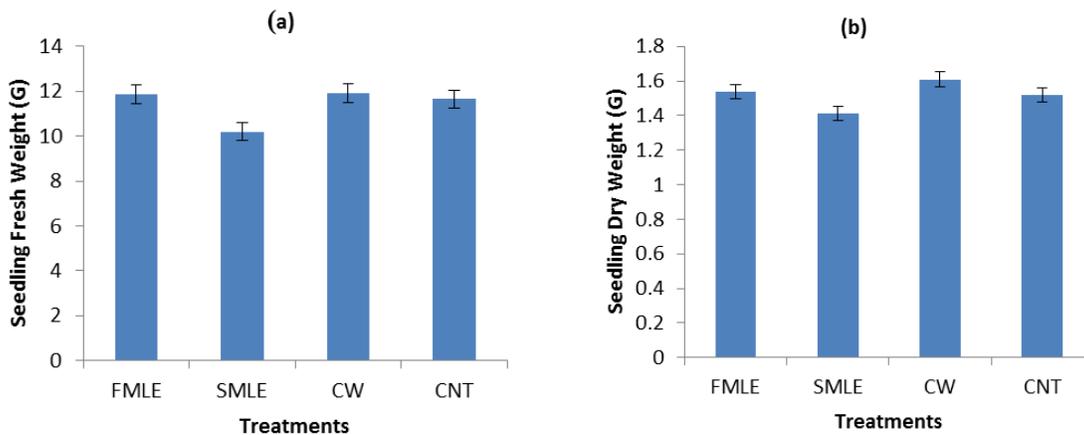


Figure 4. Influence of seed priming on (a) seedling fresh weight and (b) seedling dry weight \pm s.e. in cucumber

for 18 h. Seeds were primed with respective aerated solutions of FMLE, FCW, SMLE for 18 h. Non-primed seeds were considered as controls. Continuous aeration was provided using small aquarium pump. After each soaking treatment, seeds were dried on filter sheets for 48 hours at room temperature.

Evaluation of vigor:

Control and treated seeds were sown in a germination box, replicated three times, arranged in a completely randomized design. Quantity of emerged seedlings was noted after the third day of planting by means of the methods of the Association of Official Seed Analysts (1990) until a continuous count was attained. Mean Emergence Time (MET) was calculated according to the equation of Ellis and Roberts (1981). Energy of Emergence (EE) was documented on the fourth day next to sowing. The percentage of developing seeds at the fourth (4) day after seeding was determined next of kin to the overall number of seeds tested (Farooq *et al.*, 2006). On the fifteenth day after appearance, sprouts were analysed for potency after being cautiously removed from the sand. Number of roots, shoot and root length of five arbitrarily chosen seedlings were noted per replicate and average seedling fresh weight was determined. Instantly after the harvest; dry weight was noted after drying at 70°C for seven days. Graphical demonstration of data and standard error for comparison of treatments and counterparts drawn between rise and seedling growth was done using Microsoft Excel Program.

RESULTS

All the priming treatments were effective in reducing the Mean Emergence Time (MET) from 4.2 in the control to 3.78 in seed primed with Fresh Moringa Leaf Extract (Fig. 1), while enhancing Final Emergence Percentage (FEP) from 76% in the control to 92% in seeds primed with Fresh Moringa Leaf Extract. Seed priming with Fresh Moringa Leaf Extract, Coconut

Water and Stored Moringa Leaf Extract improved the Emergence Energy (EE) by 68 %, 64% and 56% respectively as compared to that of unprimed seeds (controlled) with 48 % Energy of Emergence (EE) which had low seed vigor and poor seed performance; (Fig. 2a and B). It was noted in this study that seed priming resulted in improved seedling growth as shown by increased root and shoot length, seedling fresh and dry weight (Fig. 3a and b; 4a and b;).

Seed priming can enhance the early germination and rapid seedling growth in cucumber. Priming of cucumber seed with plant growth regulator decreased the emergence time and increased seedling emergence and seedling fresh and dry weight. Seed Priming not only resulted in earlier and more uniform emergence and emergence percentage, energy of emergence was also improved.

DISCUSSION

The present study revealed that priming with plant growth regulators which aid as an organic hormone could be hired to improve early advent and seedling growth in cucumber. Emergence rate, root shoot lengths and seedling biomass were all vital providers of seed vigor. Increased emergence rate was the main establishment, which confirms an upgrading of overall seedling recital. The results of present study indicated that seed priming with FMLE resulted in earlier emergence, reduced MET and improved the final emergence and emergence energy as compared to FCW and SMLE (Fig. 1 and 2). Increase in germination percentage after treatment might be the consequence of higher nutrients and vitamins of FMLE and/or high content of zeatin a natural cytokining found in the leaf of moringa. Seedling vigor was also improved by treating cucumber seeds with plant growth regulator, it was noted that seed priming with fresh coconut water has the highest seedling fresh and dry weights (Fig. 4a and 4b) which might be due to increased cell division within the

apical meristem of seedling roots (Fig. 3b) from the phytohormones found in the coconut water (Kende and Zeevaart, 1997), while FMLE improved the seedling shoot length.

Hence, seed priming with extract from plant (FMLE and FCW) could be successfully employed to increase the germination percentage and seedling vigor of cucumbers in the nursery stage.

In conclusion, fresh moringa leaf extract and coconut water were effective for improving germination and early seedling growth but needs further investigation for its role in cucumber flowering and yield under various temperature and related parameters.

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