



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2015; 1(13): 79-80
www.allresearchjournal.com
Received: 10-10-2015
Accepted: 13-11-2015

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Comparative study of *Moringa oleifera* seed germination enhancement using Gibberellic acid in varying concentrations

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Abstract

Gibberellic acid (Gibberellins) are plant hormones. When purified, it is a white to pale yellow crystalline powder, soluble in ethanol and sparingly soluble in water. Germination is the process by which the dormant embryo wake up, grow out of the seed coat and establishes itself as a seedling. 36 viable seeds were soaked in different concentrations (2.5 mg/L, 5.0 mg/L and 7.5 mg/L) of gibberellic acid for 24 hours and sowed. 10 days after, the number of germinated seeds were determined. The result shows that the rate of seed germination is proportional to concentration of the gibberellic acid. The seeds treated with high concentration of gibberellic acid (7.5 mg/L) has the highest number of germinated seeds compared to those of lower concentrations of gibberellic acid whereas the gibberellic acid treated seeds was found to be higher than untreated control group (0.0 mg/L).

Keywords: Gibberellic acid, Germination and *Moringa oleifera*.

1. Introduction

1.1 *Moringa oleifera*

Moringa (Moringa oleifera Lam) is a fast growing, deciduous drought resistant tree belonging to the order Brassicales and Family Moringaceae, ^[1]. The *Moringa* tree grows mainly in semi-arid, tropical and sub-tropical areas. Today, it is widely cultivated in Africa, Central and Southern America, Sri-Lanka, India, Mexico, Malaysia and the Philippines. According to Folkard *et al.*, *Moringa oleifera* is an exceptionally, nutritious vegetable tree with a variety of potential uses. Almost every part of the tree has some beneficial properties, for instance, the leaves are rich in mineral, and vitamins and are used to curb malnutrition among the Low income earners in most less developed countries. The seeds contain oil which can be used as fuel and oiling machineries the wood can also be used in the paper industries powered seeds can also be used as clarifier and also as coagulant in water treatment ^[3]. It was discovered by Rajangam in 2001 that, the root decoction is used for treating dropsy and also as a tonic to the body and lungs. The leaves and green stems are used as cattle fodder supplement. The seeds are used as sexual virility drug for treating erectile dysfunction in men and also for prolonging sexual activity in women, ^[4].

1.2 Gibberellic Acid

Also called Gibberellins are plant hormones. When purified, it is a white to pale yellow crystalline powder, soluble in ethanol and sparingly soluble in water. In its standard state, gibberellins have a molar mass of 346.38 g/mol, melting point of about 233-235 °C, and solubility in water 5 g/L (20 °C), its chemical formula is C₁H₂₀O₆, ^[5]. The processes stimulated by Gibberellic acid were discussed in 1999 by Bandre and Pandre as; stem elongation by accelerating rapid cell division and differentiation, it promote hypocotyls growth, stimulate bolting/flowering in response to long days, break seeds dormancy in some plants which require stratification or light to induce germination, stimulates enzyme production (α-amylase) in germinating cereal grains for mobilization of seed reserves, can cause parthenocarpic seedless fruit development and can delay senescence in leaves and citrus fruits ^[6].

1.3 Germination

The process by which the dormant embryo wake up, grow out of the seed coat and establishes itself as a seedling is called germination [7]. The germination of seeds is dependent on both internal and external conditions. The most important external factors include: water, oxygen, temperature and sometimes light or darkness [8].

1.4 Study Area

The experiment was carried out at the experimental garden of Department of Plant Science and Technology, University of Jos, Plateau State (080 53' E. 090 57'N) and 1159 M above mean sea level. This study was carried out "between" March 2008 to January 2009.

1.5 Objective of the Study

In Nigeria, adequate knowledge as regards *Moringa oleifera* growth performance is limited. It is in this light that this study was designed to evaluate the effect of different concentrations of gibberellic acid on the rate of germination of *Moringa* seed on varying fertilizer levels under Jos – Plateau ecological zone.

3. Materials

Viable *Moringa* seeds (newly stored dry and matured seeds) were obtained from DAGWOM, Gibberellic acid obtained from the Department of Plant Science and Technology University of Jos.

4. Experimental Design

4.1 Method

The gibberellic acid at different concentrations (2.5 mg/L, 5.0 mg/L and 7.5 mg/L) were dissolved in 100ml of pure water. 36 seeds were soaked for 24 hours in the above mentioned concentrations of gibberellic acid in clean 250ml beaker and covered with petri-dish. The seed were sowed and started to germinate 10 days after sowing. The result of which was determined as shown in the table 1 below

5. Results and Discussion

Table 1: Effect of gibberellic acid on *Moringa oleifera* seeds germination

S/N	Gib. Acid Conc. (mg/L)	Number of seeds germinated
1	2.5	4
2	5.0	7
3	7.5	8
4	0.0 (control)	2

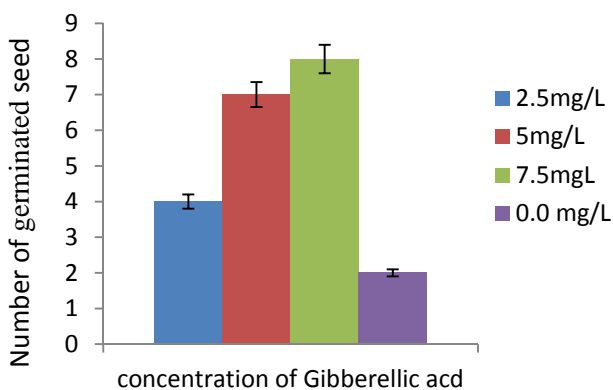


Fig 1: Comparative germination of gibberellic acid treated seeds

6. Discussion

From table 1 above it can be depicted that the germination of Gibberellic acid treated seeds is proportional to the concentration of gibberellic acid dissolved. According to Raven *et al.*, this could be as a result of the ease with which gibberellic acid penetrated the seed coat, activating hydrolytic enzymes that break down stored food resources into metabolically useful chemicals, allowing the cell of the embryo to divide and grow [12]. This is to be expected because high concentration of gibberellic acid is used in overcoming dormancy and causing rapid germination of seeds. However, the gibberellic acid treated seeds germinated more than that of control (untreated seeds).

7. Conclusion

Researches on *Moringa* are on the increase in most third World Countries, so the use of gibberellic acid, to treat seeds before sowing to enhance seed germination for large scale farming cannot be overemphasized

8. Recommendation

More growth hormones should be used to test for rapid germination and growth ex-vivo in different seeds at varying concentration.

9. Acknowledgement

We wish to acknowledge the Department of Plant Science and Technology University of Jos, Department of Biological Science Federal University Dutse and Nigeria Institute for Oil Palm research (NIFOR) Dutse Station.

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