EFFECT OF SUBSTRATUM AND SULPHURIC ACID TREATMENT ON THE GERMINATION OF KALMEGH (ANDROGRAPHIS PANICULATA NEES.)

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Abstract: A study was carried out to investigate the effect of substratum (soil-sand amendments cotton and filter paper) and treatment of sulphuric acid on the germination of Kalmegh (Andrographis paniculata Nees.) seeds were placed on moistened substratums in different containers under laboratory conditions for germination. 3000 seeds of Andrographis paniculata (100 seeds per container) with three replicates of each were used. The highest germination was recorded in sand (0:1 soil: sand) substratum. Germination was observed to be enhanced by the 25% sulphuric acid pre-treatment. Results of this study may serve as useful information in the production and improvement of this species.

Keywords: Germination, Kalmegh (Andrographis paniculata Nees), Substratum, Sulphuric acid.

INTRODUCTION

The seeds are being produced and used in the successful production and plantation. The process of production and plantation significantly depends on seed germination and seedling establishment of species. Germination is defined as the emergence and development from the seed embryo of those essential structures, which are indicative of the seeds capacity to produce a normal plant under favourable conditions (Justice 1972). Till the date, the production/plantation programs are not hundred percent successful due to poor quality of seeds in many respects, such as low germination percentage, poor emergence in the nursery beds, poor survival and poor adaptability to site.

So the introduction of innovation technologies for natural and artificial regeneration are required for the production programme. Baiyeri (2005), suggested that tropical crops are traditionally established with seedlings previously grown in a nursery. A nursery allows cultivation and establishment of seedlings under controlled conditions. Sahin et al., (2005), Agbo and omaliko (2006), declared that nursery potting media influence quality of seedlings produced. The quality of seedlings obtained from a nursery influences re-establishment in the field Baiyeri (2006), and the eventual productivity of an orchard Baiyeri and ndubizu (1994). A suitable seed bed conditions for germination and seedlings emergence depends on soil physical properties.

Andrographis paniculata (Kalmegh) is an herbaceous plant from family acanthaceae, native of India and Sri Lanka. Unlike other species of genus Andrographis paniculata is of common occurrence in most of the places in India.

Andrographis paniculata is used as a wonderful drug in traditional siddha and ayurvedic systems of medicine in India and some other countries for multiple clinical applications. The therapeutic value of Kalmegh is due to its mechanism of action which is perhaps by enzyme induction. The plant extract exhibits anti-typhoid and anti-fungal activities. Kalmegh is also reported to possess anti-hepatotoxic, anti-biotic, anti-malarial, anti-thrombogenic, anti-inflammatory, anti-snake venom and anti pyrexic properties. To mention a few, besides its general use as an immunostimulant agent. A recent study conducted at Bastyr University, Confirms anti H.I.V. activity of andrographolide.

MATERIALS AND METHODS

An experiment was conducted in net house as well as in laboratory conditions (humidity 68 ± 5 and temperature 33 ± 2°C) in Jhansi (Bundelkhand) between Oct-July 2008 with Andrographis paniculata. Seeds of A. Paniculata were collected from the forests department, Jhansi U.P.

Viability Test. The Viability Test was checked by flotation test following ISTA (1993).

Seeds were germinated by placing them on wetted substratum in different containers. In each trial, 100 seeds per container and three replicates were made for each method. Sulphuric acid treated and non-treated seed were used. A seed was considered germinated when the radical emerged by 5mm in length Cavusoglu and kabar (2007).
Seed germination percentage and germination value were determined by the following formula’s:

\[
\text{Germination Percentage} = \frac{\text{No of germinated seeds}}{\text{Total No. of Seeds}} \times 100
\]

\[
\text{Germination value} = \frac{\text{Biggest value} \times \text{cumulative total}}{\text{Maximum days}}
\]

**RESULTS**

It has been presumed that pre-sowing treatment would be helpful to overcome the seed coat imposed dormancy in a species studied.

**Seed germination**

In order to overcome the problem of germination of *A. paniculate* different containers, media and sulphuric acid treatment were used to observe the seed germination, seeds were treated with sulphuric acid and with out sulphuric acid treatment were sown in the media and the results were compared.

**Seed germination with out treatment**

(a) Seed germination in plastic boxes.

It is evident from the table 1, that maximum germination occurred in the boxes containing sand as medium followed by 1:2 and 1:0 (soil and sand ratio).

(b) Seed germination in Kunda’s (Earthen pots)

Here also maximum germination was observed in sand (0:1 soil : sand) followed by 1:0, 1:1 and 1:3 soil : sand ratios.

(c) Seed germination in petri plates containing filter paper and cotton as substratum.

In the petriplates highest germination was reported in the containers containing filter paper as substratum table 1.

**Seed germination with sulphuric acid treatment**

(a) Seed germination in plastic boxes

When the seeds were treated with 25% sulphuric acid, highest germination was again found in sand 0:1 followed by 1:3, 1:0 and 1:1 soil : sand ratios. Table-2.

(b) Seed germination in Kunda’s (earthen pots)

Seed germination was reported highest in 0:1 followed by 1:0, 1:3, 1:1 soil : sand amendments.

(c) Seed germination in petri plates containing filter paper and cotton as substratum.

Highest germination was reported in filter paper followed by cotton.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Characters</th>
<th>Above Soil (Plastic Box)</th>
<th>Below soil (1.5 cm depth) (Earthen Pot)</th>
<th>Above Cotton (Petri dish)</th>
<th>Below filter paper (Petri dish)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>1 : 1</td>
<td>1 : 3</td>
<td>0 : 1</td>
</tr>
<tr>
<td>1</td>
<td>Germination Percentage (%)</td>
<td>25.0</td>
<td>23.0</td>
<td>25.0</td>
<td>37.0</td>
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<tr>
<td>2</td>
<td>Germination value</td>
<td>2.29</td>
<td>1.79</td>
<td>2.37</td>
<td>5.52</td>
</tr>
</tbody>
</table>

Table 2. B-( Seed germination with sulphuric acid treatment)

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Characters</th>
<th>Above Soil (Plastic Box)</th>
<th>Below soil (1.5 cm depth) (Earthen Pot)</th>
<th>Above Cotton (Petri dish)</th>
<th>Below filter paper (Petri dish)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>1 : 1</td>
<td>1 : 3</td>
<td>0 : 1</td>
</tr>
<tr>
<td>1</td>
<td>Germination Percentage (%)</td>
<td>32.00</td>
<td>31</td>
<td>32.33</td>
<td>42</td>
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<tr>
<td>2</td>
<td>Germination value</td>
<td>6.44</td>
<td>5.70</td>
<td>7.29</td>
<td>12.47</td>
</tr>
</tbody>
</table>
Fig. 1. Seeds germination in earthen pots

Fig. 2. Seeds germination in plastic boxes
DISCUSSION

The result of the experiment revealed that substratum and pretreatment of sulphuric acids play a vital role in the seed germination of *A. paniculata*. It was observed that the seed germination increased when the seeds were treated with 25% sulphuric acid as compared to untreated seeds of the same species. A similar result was obtained by Awodola (1994) and Muhammad and Amusa (2003).

Similarly the substratum and containers also play an important role in the seed germination. The experiment revealed that maximum germination were observed in 0:1 (soil and sand amendment) although soil essentially contributes the basic macro and micro nutrients required for plant growth, sand provides porosity and drainage.

REFERENCES


