

Seed germination studies in *Withania somnifera* (L) Dunal. in varying conditions

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ABSTRACT

Freshly harvested seeds of Ashwagandha showed dormancy. The germination percentage in scarified seeds was 40. One year stored seeds germinate upto 4%, but percentage can be enhanced by placing the seeds in mixed soil with coco-pit on upper layer in pot. There was 33% germination on blotting paper bridge in MS media containing 1 mg, GA₃ per litre. Negligible germination was observed in MS media without GA₃. MS media with auxins and/or kinetin were not effective in enhancing seed germination.

Key words: Germination, seed, varying conditions and *Withania somnifera*.

INTRODUCTION

Withania somnifera belongs to family Solanaceae and is commonly known as *Ashwagandha*. It is a medicinal plant used from the time of Ayurveda, the ancient system of Indian medicine (Garg and Kumar, 2004). It is sedative, anti-inflammatory and nerve toner. The plant species grows as wild plant in Rajasthan and Madhya Pradesh. Several cultivars can be noticed differing in leaf architecture. A survey of literature revealed meagre works on germination potential and *in vitro* propagation (Kumar *et al.*, 2001). The present investigation reveals seed germination in varying conditions.

MATERIAL AND METHODS

The material for present investigation is locally adapted population of Ashwagandha from Patna. Seeds were obtained from dried berries. Sand paper was used for mechanical scarification. In coco pits experiments, stored seeds were placed after soaked in distilled water for 24 hours in mixture of sand and garden soil with coco-pits on upper layer in flat pot.

For *in vitro* germination in MS media containing growth regulators, seeds were soaked in water for 24 hours at room conditions. They were washed with 5% v/v teepol for 5 minutes. After that they were surface sterilised by HgCl₂. Again they were washed with distilled water. Now they were placed on blotting paper bridge in tube containing MS media having growth substances like GA₃ or auxins or kinetin or in combinations. Twelve such tubes were taken and were kept in light with 2000 lux intensity or in dark.

During germination in half strength media a fungicide Bavistin and Streptomycin, an antibiotic were added. Seeds with 1mm radicle were taken as germinated. The experiments were partly conducted in Department of Botany, Patna University, Patna and partly in Renaissance Biotech Pvt. Ltd., Patna.

RESULTS AND DISCUSSION

Seed dormancy

Freshly harvested seeds were placed onto blotting paper backed with cotton wool in Petridishes. The initiation period was four days.

Twenty five percent seeds germination within 7days. It signifies some sort of dormancy.

Physical treatment

The scarified seeds were placed in petridishes for germination. The germination percentage was 40.

Germination of stored seeds

Seeds were stored for varying periods. One year stored seeds were taken for germination. The germination percentage was 4. There was no germination after 9th day.

Germination of one year stored seeds in mixed soil with coco-pit on upper layer in pot

To enhance germination potential of stored seeds, they were placed in flat pot for soaking in distilled water for 24 hours in mixture of sand and garden soil with coco-pit on upper layer. Three hundred seeds were taken. There was initiation of germination after 16 days. The germination continued for 10-15 days. The final germination percentage was 90.

In vitro germination in MS media containing GA₃

The initiation period for germination was 7 days. There was 33% germination in 5 tubes (Table 1).

In vitro germination in half strength media

Seeds were placed in half strength MS media with 1% W/V sucrose without any growth regulator. Seeds inoculated were placed in dark for 1 week. After 7 days, the tubes were transferred to white fluorescent light at 2000 lux intensity with 16 hour day length. Initiation period for germination was seven days. There was 18 tubes in total. Seven seeds were there in each tube. But only one seed each germinated in 6 tubes only.

In vitro germination in MS media containing auxins

Auxins like IAA (0.5 mg/l and 1 mg/l) and IBA (0.5 mg/l and 1 mg/l) were tried with MS media for germination. In IBA, seeds were dried and there was no germination. In IAA, seeds swelled but dried (Table 1).

Table 1: Seed germination of *Withania somnifera* in varying conditions

S. No.	Combinations	No of seeds taken/tube	Incubation	Initiation period in days	Germination percentage	Remarks
1	MS+GA ₃ 1mg/l	3	2000Lux	7	33	-
2.	Half strength MS meda with 1 % w/v sources	7	Dark for 1 week then 2000 Luxlight Intensity	7	14.28	-
3.	MS+IBA 0.5 mg/l	4	1200 Lux	-	-	Seeds dried
4.	MS+IBA 1 mg/l	4	1200 Lux	-	-	Seeds dried
5.	MS+IAA 0.5 mg/l	4	1200 Lux	-	-	Seeds swelled but dried
6.	MS+IAA 1 mg/l	4	1200 Lux	-	-	Seeds dried
7.	MS+IAA 0.5mg/l+ BAP+1.0 mg/l	4	Dark	28	50	-
8.	MS+IBA 0.5mg/l+ BAP1.0mg/l	4	Dark	29-30	50	-
9.	MS+IBA 0.5mg/l+ BAP 1.5mg/l	4	Dark	-	-	Swelling
10.	MS+Kinetin 0.2 mg/l	4	1200 Lux	-	-	Seeds appeared black

***In vitro* germination in MS media containing IAA and BAP**

Here tubes were incubated in dark. Germination was started after 28 days. There was 50% germination.

***In vitro* germination in MS media containing kinetin**

Here tubes were incubated in 1200 Lux light intensity. Seeds appeared black and there was no response (Table 1).

Kumar *et al.*, 2001 have worked out seed germination studies in 4 morphotypes of *Withania somnifera*. They achieved highest germination in July to August sowing. Kahar *et al.*, (1999) have also reported highest root yield of Ashwagandha with crops sown in early August.

The germination of stored Ashwagandha seeds was achieved upto 90% in mixed soil with coco-pit in upper layer.

Gibberellic acid is known to release dormancy in seeds of many plants. Here 1 mg/litre GA₃ was used in MS media tube. It is surprising that only 33% seeds germinated in 5 tubes out of 12 tubes taken. In other 7 tubes, there was no germination at all. When seeds were placed in half strength media without GA₃, the germination was negligible. It means that there was improvement in germination with GA₃.

Germination inhibitors in Ashwagandha seeds was suggested by Karnick (1978). The poor germination on filter paper and even in MS media indicates seedcoat dormancy coupled with deficient food reserves.

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