



EFFECT OF PHYSICAL AND CHEMICAL TREATMENTS ON DORMANCY BREAKING, GERMINATION AND VIGOUR OF CERTAIN MEDICINAL PLANTS

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Abstract- Laboratory tests were conducted with physical and chemical treatments on germination percent and vigour of certain medicinal plants viz., Ashwagandha (*Withania somnifera* L.), Senna (*Cassia angustifolia* L.), Tulasi (*Ocimum sanctum* L.) and Adavi vulavalu (*Cassia absus*). The physical treatments given are: Hot water treatment, Pin pricking and Sand paper scarification. The chemical treatments consists of : KNO₃ (0.5 and 1.0%), GA₃ (500 and 1000 ppm), NAA (200, 500 and 1000 ppm). The results revealed that among the physical seed treatments, Sand scarification gave the highest germination (85%) in Adavi vulavalu compared to pin pricking (70%). Hot water treatment also recorded high germination% and vigour in Senna (92%), Tulasi (84%), Ashwagandha (70%) and Adavivulavalu (50%) compared to control.

Keywords- Medicinal plants, dormancy, germination

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Introduction

Medicinal plants are gaining much importance for their ayurvedic and allopathic properties with ample scope for their export potential and as such their cultivation became indispensable. For successful cultivation of these crops, knowledge on their propagation techniques is utmost important. Good quality seed without dormancy is very essential for sowing to get high germination% ,field emergence and establishment of crop stand. The germination capacity of seeds of medicinal plants is normally low due to the presence of dormancy. Some physical and chemical treatments to overcome dormancy in medicinal plants were reported [2,4]. Hence, the present study was taken up with the objective to find out appropriate dormancy breaking methods in four medicinal plants.

Materials and methods

Laboratory tests were conducted to know the effect of physical and chemical seed treatments in breaking dormancy and improv-

ing germination of four medicinal plants viz., Ashwagandha (*Withania somnifera* L.), Senna (*Cassia angustifolia* L.), Tulasi (*Ocimum sanctum* L.) and Adavi vulavalu (*Cassia absus* L.). Seeds of these plants were collected from Herbal garden of ANGRAU Rajendra nagar, Hyderabad. There was dormancy in seeds of all medicinal plants except Senna under present study. Hundred seeds of each species in three replications were used in the test. They were given physical and chemical treatments and subjected to germination following between paper method in a seed germinator at 25°C ± 1 and relative humidity of 90% ± 2. The physical treatments given to Adavi vulavalu were: scarification with sand paper (5-10 min), pin pricking and hot water treatment (at 80°C for 1-5 min) due to its hard seed coat, where as only hot water treatment was given for other varieties of seeds. In control, seeds of each variety were kept for germination under normal condition without any treatment. The chemical treatments comprised of : KNO₃ (0.5 and 1.0% solution for 24 hrs), GA₃ (500 and 1000 ppm for 24 hrs), NAA (200,500 and 1000 ppm for 24

hrs) and control. The seeds were observed daily for radicle and plumule emergence. Germination counts (initial and final) were taken i. e at 14th and 18th day for Ashwagandha; 7th and 11th for Senna; 5th and 11th for Tulasi and 7th and 12th for Adavi vulvalu and germination % was calculated by using the formula:

$$\text{Germination \%} = \frac{\text{No. of seeds germinated}}{\text{Total no. of seeds sown}} \times 100$$

Results and discussion

The results of the present study indicated that all the physical seed treatments significantly increased germination % in all the four medicinal plants compared to control among which hot water treatment was found effective (Table-1). The germination % recorded in hot water treatment was highest in Senna (92%) followed by Tulasi (84%), Ashwagandha (70%) and the least in Adavi vulvalu (50%) where as in control the germination was 76, 80, 64 and 5% respectively. However, in Adavi vulvalu sand scarification (85%) and pin pricking (65%) were found more effective in breaking dormancy and enhancing germination. These treatments makes the hard seed coat soft and permeable for both water and gases which results in germination. Similar reports were made by [3,4] in kalmegh.

Table 1- Effect of physical seed treatments on germination % in four medicinal plants

Treatment	Ashwagandha	Senna	Tulasi	Adavi vulvalu
Hot water	70	92	84	50
Pin pricking	65
Scarification	85
Control	64	76	80	5

Chemical seed treatments were also exhibited quite encouraging results in breaking dormancy and promoting germination (Table-2). All the three chemicals at higher concentration showed higher germination % compared to low concentration and control. It was the highest in Tulasi (95%) @ 1.0% KNO₃ and GA₃ 1000 ppm followed by NAA 1000 ppm (65%). Similar results were observed in other crops also.

Table 2- Effect of chemical seed treatments on germination % in four medicinal plants

Germination %				
Treatments	Ashwagandha	Senna	Tulasi	Adavi vulvalu
KNO ₃ 0.5%	60	70	65	0
1.00%	75	85	95	5
GA ₃ 500ppm	40	53	60	13
1000ppm	65	72	95	20
NAA 200ppm	10	25	45	10
500ppm	25	60	65	25
1000ppm	40	75	70	35
Control	7	20	30	0

The observed increase in germination % with these chemicals might be due to the activation of enzymes and favourable metabolic processes enabling mobilization of food reserves to the embryo. The beneficial effects of chemicals seed treatments on promoting germination and vigour were reported [1,2].

From the above results and discussion, it can be concluded that seed dormancy is overcome and germination % enhanced by physical seed treatments like sand paper scarification and pin pricking for Adavi vulvalu and hot water treatment for Ashwagandha, Senna and Tulasi. Depending on the availability, KNO₃ (1.0%) and GA₃ (1000 ppm) can also be recommended for seed treatment to assure good germination and emergence in the field.

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