



EFFECT OF SOWING MEDIA ON SEED GERMINATION AND SEEDLING SURVIVAL OF *AMMI MAJUS L.*

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ABSTRACT:

Seed germination, seedling emergence and survivorship of seedlings are affected by various factors. Sowing media is one such factor, which have significant impact on seedlings quality and yield of any crop. An experiment was designed to determine appropriate sowing media for sowing *Ammi majus L.* The purpose of this study was to examine the effect of planting media on seed germination, emergence and survival of seedlings of *Ammi majus L.* Three different sowing media i.e., Growth mixture (sand: cocopeat: vermicompost in 1:1:1 ratio) (T1), Sand (T2), Soil (T3) were compared with control (H₂O) and evaluated. The best germination and survival percentage was exhibited by growth mixture, 71% and 66% respectively followed by sand, water(control) and soil respectively. The rate of germination was fastest in the case of growth mixture which achieved its maximum germination by 2nd week. Garden soil showed slowest rate of germination and took about three weeks for total germination (58%) to occur. The statistical analysis has revealed that Growth mixture exhibited a statistically significant accretion of over 12.69% in germination and 10% in survival percentage over control/ water. Hence growth mixture (equal parts of sand, cocopeat and vermicompost), was found to be most suitable germination media.

Keywords: - Seed Germination, Seedling emergence, Survivorship, *Ammi majus*, Growth mixture etc.

INTRODUCTION :

Ammi majus L. is a plant with multifunctional medicinal properties which belongs to the family Apiaceae. Its common names are Aatrilal, Bishop's weed, Greater *Ammi*, False Queen Anne's lace, Bullwort, Lace flower and Honey flower. It is a native of Nile Delta of Egypt and widely grown throughout the Mediterranean region, Abyssinia, Africa and some parts of Egypt. In India, it was first introduced in the Forest Research Institute, Dehradun, in 1955 through the efforts of UNESCO. Since then, its experimental cultivation has been tried in several parts of the country including Jammu, Dehradun, Mumbai, Chennai, Delhi and Punjab. Its cultivation has been undertaken in Jammu by Bradu and Atal in 1970. Later on, its cultivation has been extended in Punjab and in some parts of Rajasthan also.

Ammi majus L. is known for its high coumarin content, particularly furanocoumarins. Coumarin, umbelliferone, bergapten, xanthotoxin, isopimpinellin, imperatorin and isoimperatorin have been reported from the plant (Friedman et al., 1982, Wager & Bradt, 1996). The drug has been the subject of a great deal of chemical and pharmacognostical investigations, due to the utility of its active constituents in various ailments.

A. majus L. is regarded as the richest, natural source of linear furanocoumarins called psoralens. These compounds are found mostly in the fruits of this species (Nielsen 1964, 1970). In *Ammi majus L.* seed harvest should be done separately for primary and secondary level umbellets, that are major contributors of good quality seeds (Megha et. al., 2017). Like most medicinal compounds, furocoumarins might have potential as natural (or synthetic)

pesticides. Furocoumarins have bactericidal, fungicidal, insecticidal, larvicidal, molluscicidal, nematocidal, ovicidal, viricidal and herbicidal activities (Duke, 1988). The psoralens are successfully applied in photochemotherapy of numerous dermatological diseases, e.g., in treating vitiligo, psoriasis, mycosis fungoides, atopic eczema, pityriasis lichenoides, urticaria pigmentosa, alopecia areata, and others.

MATERIALS AND METHOD :

Collection of seed material

Seed material for experiment of *Ammi majus* L. was procured from the herbal garden of Hamdard University, New Delhi.

Seed Sterilization

Working seed sample of *Ammi majus* L. was selected for uniformity. There are 4 replicates for each treatment. Each replicate constituted of 25 seeds. Seeds are sterilized with 0.1% mercuric chloride washed thoroughly with distilled water prior to the experiment.

Experiment

Experiment constituted of germinating 25 seeds in disposable plastic sowing plates. Holes were made in the plates for better aeration. Seeds were sown in different substrates - (T₁) Growth mixture (sand: cocopeat: vermicompost in 1:1:1 ratio), Sand (T₂), Soil (T₃) and Control water (T₄). The plates were regularly moistened to ensure saturation throughout the germination tests. Germinated seeds and diseased/died seeds were observed and counted till four weeks and then calculated for germination and seedling survival percentage.

OBSERVATION :

Three germination media i.e., growth mixture, sand, soil and control (water) were analyzed regarding their effect on seed germination. Seed germination studies were conducted during the months of October and November, which is the natural period for the seed germination for this species (Megha et. al., 2012). Seed germination studies were carried on seeds harvested from the

previous season i.e., after about 6 months of their harvesting. All seeds were taken from the same seed lot and from the same working sample. Percent germination was calculated 30 days after sowing. Seed germination was noticed on 7th day after sowing. A maximum of 71% seed germination was recorded in the growth mixture. A maximum of 1.5% seedlings got infected or turned black and failed to survive. Survival % of seedlings was also calculated a month after the date of sowing [Table No.1, Plate No. 1 & Fig. No. 1(a)].

The experiment was repeated 3 times during the favorable natural germination period to confirm the results of this experiment. The results of this experiment are tabulated in the [Table No. 1, 1(a), Plate No. 1, Fig. No. 1,1(a) & 1(b)]. On perusal of the data, it is evident that the three media have affected both the germination and the seedling survival percentage of *Ammi majus*. The maximum mean germination percentage of 71% and mean survival of seedling of 66% has been recorded in treatment type T₁ i.e. in the growth mixture which is constituted of Sand: Cocopeat: Vermicompost in a ratio of 1:1:1. Minimum mean germination of 58% and mean survival rate of 52% was recorded in the case of treatment type T₃ i.e. soil. The other two treatments i.e. T₂ and T₄ fall in between. Over all pattern of seed germination in the three media may be written as

Percent Seed Germination: T₁ (71%) > T₂ (65%) > T₄ (63%) > T₃ (58%)

Percent Seedling Survival: T₁ (66%) > T₂ (62%) > T₄ (60%) > T₃ (52%)

As regarding pattern of germination is concerned germination starts on the 7th day with about 12% seed germinating, maximum germination or the germination peak is witnessed on 9th to 11th day (68%). Effect of different media on germination can be depicted as percent enhancement or inhibition over control (H₂O).

Percent enhancement / inhibition of seed germination and seedling survival:

Germination: T₁ (+12.69%) > T₂ (+3.17%) > T₃ (-7.93%)

Survival: T₁ (+10%) > T₂ (+3.33%) > T₃ (-13.33%)

ANOVA Analysis of the data reveals that different sowing media significantly (P<0.001) affect seed germination and survival of seedlings of *Ammi majus* L. and of the four media types, Growth mixture was found most effective and Soil was found least effective as compared to control. On pair wise multiple comparison (Fisher LSD method) and Least Significance Difference (LSD) values at 5 % revealed that the data is statistically significant with overall significance at level p<0.001. The Co-relation Coefficient between T₂ (Sand) and T₄ (Control) which was not significant indicating that sand does not show better/worse germination as compared to control.

RESULT AND DISCUSSION :

As for sowing media is concerned three media, 1 - growth mixture (Equal parts of sand, cocopeat and vermicompost), 2 - sand and 3 - garden soil (sandy loam), were compared with control (water) and evaluated. The best germination and survival percentage was exhibited by growth mixture, 71% and 66% respectively followed by sand, water and soil respectively. The rate of germination was fastest in the case of growth mixture which achieved its maximum germination by 2nd week. Garden soil showed slowest rate of germination and took about three weeks for total germination (58%) to occur. *Ammi* exhibited total germination time of about two to three weeks depending upon the substrate used. Peak germination time occurred around 9-13 (mostly 11th day) days after sowing [Table No. 1, Plate No. 1, Fig. No. 1, 1(a) & 1(b)]. About 4-5% germinating seedlings could not survive on average in all media types. Growth mixture exhibited a statistically significant

accretion of over 12.69% in germination and 10% in survival percentage over control/ water. Hence growth mixture (equal parts of sand, cocopeat and vermicompost), was found to be most suitable germination media.

The waste crop residues can be utilized in agricultural fields to improve crop productivity and soil quality after undergoing composting before being used as manure (Deepshikha et. al.,2014). As per literature search, *Ammi* can grow in almost any soil type and does not seem to be temperamental about soil conditions. The soil should be fertile and moist. A wide variety of soils from sandy loam to clayey loam are suitable. However, a well-drained loamy soil is the best. Waterlogged soils are not good. Being a hardy crop, it thrives on poor and degraded soils also but prefers a well-drained soil in a sunny position (Bown, 1995). Any well-drained soil rich in organic matter are good for its growth (Duke, 1988; Panda, 2004; Dhananjay Deshpande, 2010).

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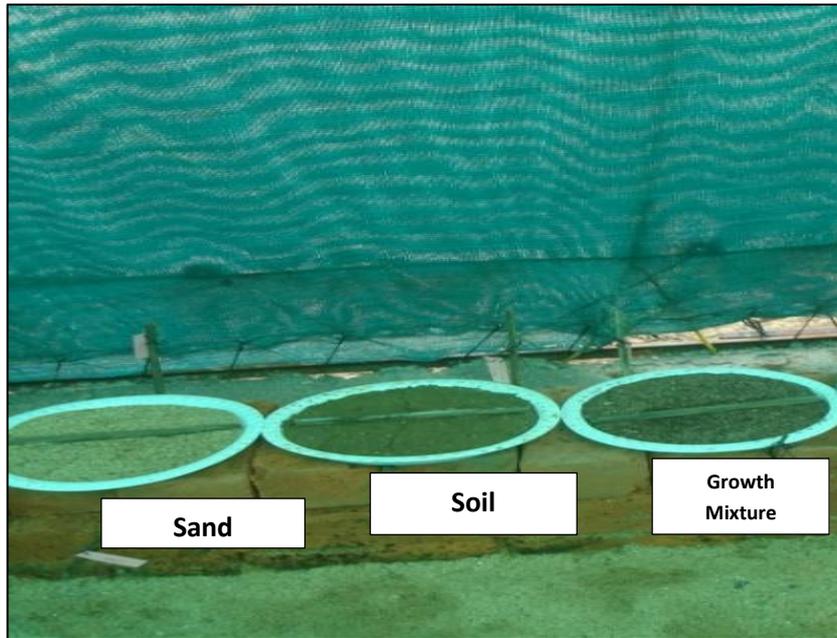
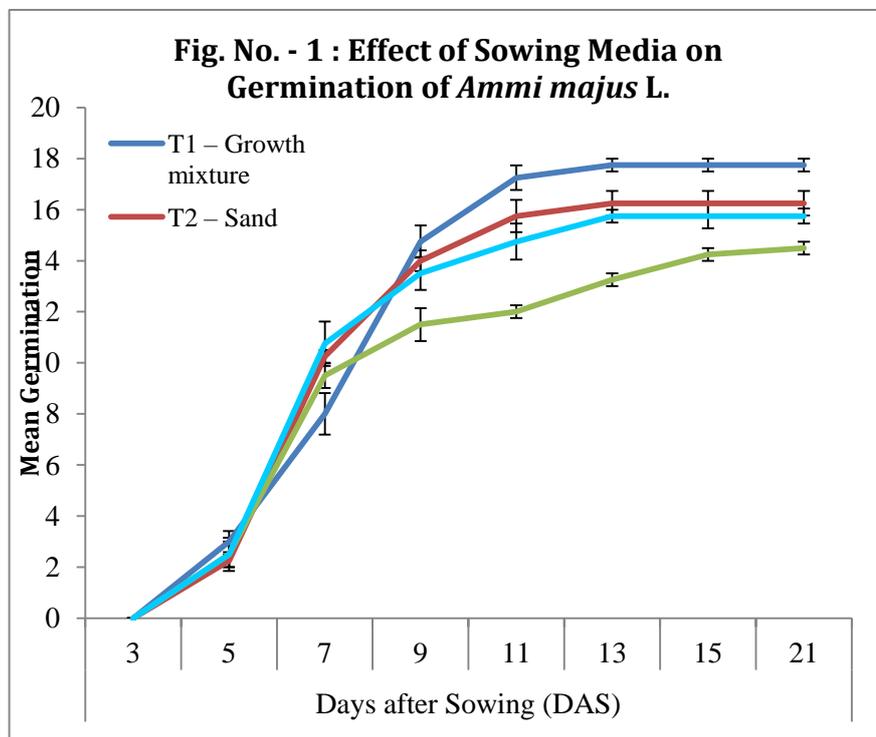


Plate No. -1: Effect of Sowing Media on Seed Germination



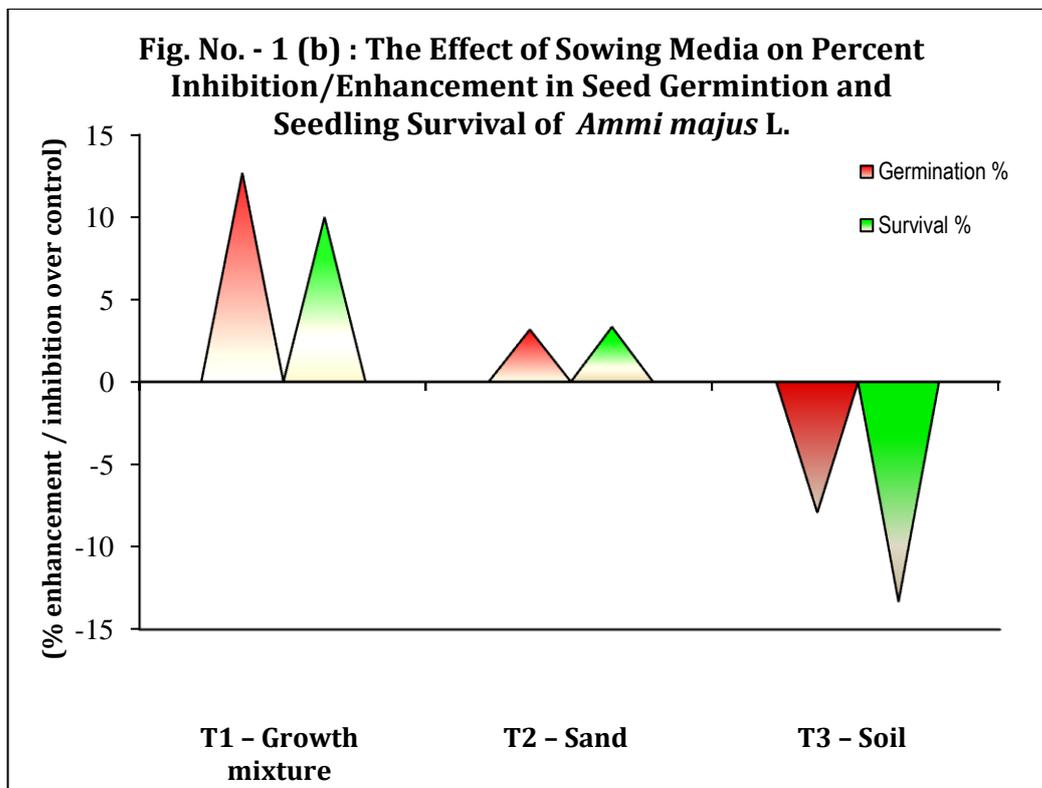
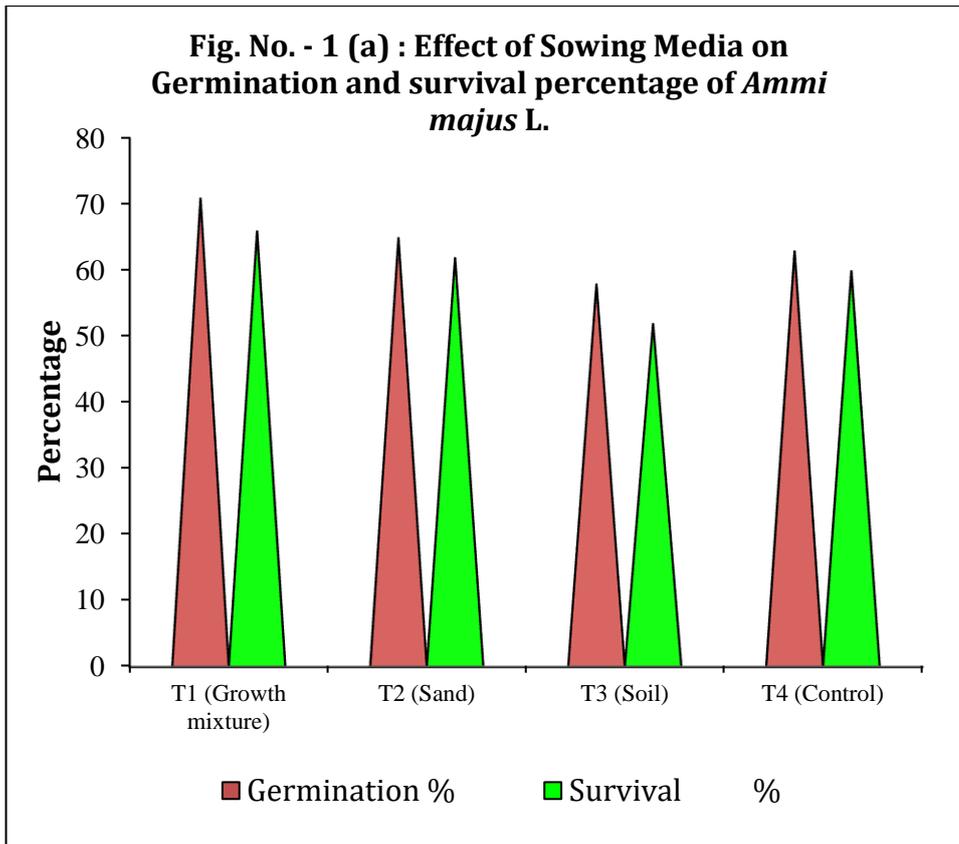


Table – 1: Effect of Sowing Media on Seed Germination of *Ammi majus* L.

Sl. No.	Treatments	Germination %	Survival %
1.	T ₁ (Growth mixture)	+12.69	+10
2.	T ₂ (Sand)	+3.17	+3.33
3.	T ₃ (Soil)	-7.93	-13.33

Table – 1(a): The Effect of Sowing Media on Percent Inhibition / Enhancement in Seed Germination and Seedling Survival of *Ammi majus* L.

Sr. No.	Treatments	Stats	Mean Germination (%) Days after Sowing (DAS)								Germination % 30 Days	Dead seedlings 30 Days	Survival % 30 Days
			3	5	7	9	11	13	15	21			
1.	T ₁ (Growth mixture)	\bar{x}	Nil	3.000	8.000	14.750	17.250	17.750	17.750	17.750	71.000	1.333	66.000
		S _D	Nil	±0.816	±1.633	±1.258	±0.957	±0.500	±0.500	±0.500	±2.000	±0.577	±2.309
		S _{ER}	Nil	±0.408	±0.816	±0.629	±0.479	±0.250	±0.250	±0.250	±1.000	±0.289	±1.155
2.	T ₂ (Sand)	\bar{x}	Nil	2.250	10.250	14.000	15.750	16.250	16.250	16.250	65.000	1.000	62.000
		S _D	Nil	±0.500	±0.500	±0.816	±1.258	±0.957	±0.957	±0.957	±3.830	±0.000	±2.309
		S _{ER}	Nil	±0.250	±0.250	±0.408	±0.629	±0.479	±0.479	±0.479	±1.915	±0.000	±1.155
3.	T ₃ (Soil)	\bar{x}	Nil	2.500	9.500	11.500	12.000	13.250	14.250	14.500	58.000	1.500	52.000
		S _D	Nil	±1.291	±1.732	±1.291	±1.414	±0.500	±0.957	±0.577	±2.309	±0.577	±3.266
		S _{ER}	Nil	±0.645	±0.866	±0.645	±0.707	±0.250	±0.479	±0.289	±1.155	±0.289	±1.633
4.	T ₄ (Control)	\bar{x}	Nil	2.500	10.750	13.500	14.750	15.750	15.750	15.750	63.000	1.333	60.00