I -29

Patterns of seed germination and seedling growth of *Azadirachta indica* A.Juss(Neem).

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Azadirachta indica A.Juss(Neem)의 종자 발아율 및 유묘생장 Pattern

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Objectives

Azadirachta indica A. Juss (neem) is a multipurpose tree and finds diverse uses in the indigenous system of medicine. The objective of this experiment was to cultivate the Neem in S. Korea and examine its growth characteristics.

Materials and Methods

Seed Germination test: To determine the germination rate in different temperature (32, 28, 25 and 20°C), seeds were placed in water moistened Petri dishes in a growth chamber and their radical protrusion was examined as seed germination. Likewise, germination tests were conducted in green house in different soil (bed soil, sandy soil, red colored soil) and in open field (sandy soil). To determine the effects of plant growth regulator on seed germination, MS medium supplemented with agar at different concentration of GA_3 were also used.

Seedling growth characteristics: The one month old plants from the sowing dates were examined their growth characteristics and compared.

Results

The seed germination in filter paper was started in three days of sowing and 32°C showed the highest percentage of germination followed by 28 and 25°C (table 1). Likewise, seed germination in bed soil in green house showed the highest percentage of seed germination with 73.3%, whereas the rate of germination decreased in other soil. The germination rate in open field was the lowest compared to all other types of soil tested in the experiment (Table2). The Germination rate of Neem seed under 16/8h photoperiod *in vitro* revealed that the use of GA_3 (10 mg/l) with MS medium gave optimum germination (table 3).

The growth characteristics of one month old plants grown in different condition were compared and showed that the better growth condition was found in temperature controlled chamber and in bed soil in green house (table 4).

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Table 1. Seed germination in different temperature in controlled chamber.

Temp °C	Rep	TSG(20seeds)	GD(10days)	GV(%)	GR(%)
32	I	14	1.4	25	70
	II	13	1.3	15	65
	III	14	1.4	25	70
28	I	13	1.3	5	65
	II	12	1.2	0	60
	III	13	1.3	10	65
25	I	12	1.2	0	60
	II	12	1.2	5	60
	III	9	0.9	15	45
20	I	6	0.6	0	30
	II	4	0.4	0	20
	III	3	0.3	0	15

GD: mean number of germination seed/day
GV: mean of seed germination vigor rate first 3 days (%)
GR: mean of seed germination rate (%)
TSG:Total seed germination/10days (during 10 days)

Table2. Neem seed germination under different soil environment (in green house and open field)

environment	Soil type	Rep	TSG(20seeds)	GD(20seeds)	GV(%)	GR(%)
Green house	Bed soil	I	14	0.7	30	70
		II	16	0.8	10	80
		III	14	0.7	10	70
	Sandy	I	4	0.2	0	20
		II	4	0.2	0	20
		III	2	0.1	0	10
	Red	I	2	0.1	0	10
		II	2	0.1	0	10
		III	0	0	0	0
Open field	sandy	I	2	0.1	0	10
		II	3	0.15	0	15
		III	1	0.05	0	5

GD: mean number of germination seed/day
GV: mean of seed germination vigor rate first 9 days (%)
GR: mean of seed germination rate (%)
TSG:Total seed germination/20days (during 20 days)

Table 3. Germination rates of Neem seed under 16/8h photoperiod *in vitro* under different growth regulators.

Growth regulators	Rep	No. of seeds	Germination/day				TSG	TGP
			3rd	4th	5th	6th		
MS	I	10	3	3	1	0	7	75
	II	10	3	3	0	1	7	
	III	10	2	4	2	0	8	
	IV	10	4	3	1	0	8	
MS+GA_3(5mg/l)	I	10	4	4	1	0	9	82.50
	II	10	5	2	0	0	7	
	III	10	3	4	1	0	8	
	IV	10	4	5	0	0	9	
MS+GA_3(10mg/l)	I	10	4	5	0	0	9	87.50
	II	10	5	3	0	0	8	
	III	10	4	5	1	0	10	
	IV	10	5	3	0	0	8	

TSG: Total Seed Germination
TGP: Total Germination Percentage.

Table 4. Growth characteristics of Neem seedlings in different environment.

Environment	Soil type	Plant Height (cm)	No.of leaves	Leaf length (cm)	Nodes/ internodes	No.of branches	Cotyledon character.
Green house	Bed soil	6.7	3.3	5.7	3/2	0	Two cotyledons intact, green, shrink.
	Sandy	4.06	2.6	2.6	2/1	0	Two cotyledons intact, yellow, shrink.
	Red	3.9	2	2.1	2/1	0	Two cotyledons intact, yellow, shrink.
Field	Sandy	1.8	2	1.6	2/1	0	Two cotyledons intact, yellow, shrink.
Controlled Chamber	Bed soil	8.9	5.5	5.7	5/4	0	Two cotyledons intact, green, shrink.

Mean data of five plants of each soil type.