



GERMINATION OF SOME SEEDS IN VARIOUS TYPES OF CLAY UNDER DIFFERENT CONDITIONS

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ABSTRACT

In the present work, the seed germination of brinjal (*Solanum melongena*), tandaljo (*Amaranthus polygamus*), radish (*Raphanus Sativus*) and bhindi (*Abelmoschus esculentus*) on the basis of different salinity levels has been studied. Different salinity levels of soil samples have been collected from the specific area of the Gujarat state like Ahmedabad, Surat and Gandhidham.

It was observed that plants like brinjal, tandaljo, radish, and bhindi are more sensitive towards salinity during germination and early seeding growth, while some are during later stages of development. 0.2% and 0.4% salinity levels have affected most to the seed germination.

Key words: Salinity, Seed germination, Clay.

INTRODUCTION

Gujarat state is situated on the west coast between 20°6' to 24°42' North latitude and 68°10' to 74°28' East longitudes. About 1.214 million hectares of Gujarat suffers from the salinity problem, which occupies 6.2 % area of the state. Some plants are much more sensitive towards salinity during germination and early seeding growth while some are during later stages of development.

In India, pioneering work has been done by the Scientists of the Central Soil Laboratory at Karnal. Saline alkali soils in Gujarat state have been critically studied by Bhumbla et al.¹ and Talati². Moreover the study of the Rann of Kutch and master plan for this has been carried out by FAO team (Dutch Experts)³ headed by Prof. Vlugter. Similar investigations have also been done by a study team headed by Khemchandani⁴.

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Salinity affects mostly the seed germination and as a result, many times seeds are not germinated. Ultimately, farmers suffer from the economic problems. Present study will be helpful to the farmers, who will get great help in farming successfully; particularly, these crops.

The seed germination of brinjal (*Solanum melongena*), tandaljo (*Amaranthus polygamous*), radish (*Raphanus Sativus*) and bhindi (*Abelmoschus esculentus*) on the basis of different salinity levels have been study by Patel and Patel⁵.

Water quantity and use of saline water for crop reduction with special reference of Gujarat state has been studied by Talati².

EXPERIMENTAL

Materials and methods

In the present work, soil samples of Surat, Ahmadabad and Gandhidham have been collected. The soil of Surat is K-M-I (Kaolinite) type, the soil of Ahmedabad is (Montomorillonite) type and the soil of Gandhidham is K-I (Iolite) type.

Soil sample were collected from each location of above mention cities, which were affected with salinity. For the study of seed germination, seeds were planted in petri dishes, containing 200 g of soil. Moisture content was maintained at field level as suggested by Mehta and Desai⁶ and losses in moisture content were made up by weighting the dishes and adding the required quantity of distilled water everyday. The plants were kept in a cage at room temperature. The percentage of germination was recorded everyday and the experiment was terminated at the end of the 10th day by taking average shoot length. Normal, 0.2% and 0.4% salinity levels were taken for the present work, because 0.2% and 0.4% salinity level generally were found to suppress the seed germination. It was found than these vegetable species are more sensitive to salinity on there particular levels.

RESULTS AND DISCUSSION

Results of the percentage of germination of seeds at different salinity levels are represented Table 1. It was observed that the K-M-I clay proved to best for seed germination, where as K-I type clay comes next in the order.

Tandaljo is the most salt tolerant vegetable species and it could bear nearly 0.4% salinity level out of three most common vegetables species of Gujarat taken for the experiments, while another three species were not salt tolerant.

Table 1: Seed germination in various types of clay under different conditions

Seed	Soil	Clay type	Total seed germination (%) on the end of the day										Average shoot length (cm)
			1 st day	2 nd day	3 rd day	4 th day	5 th day	6 th day	7 th day	8 th day	9 th day	10 th day	
Brinjal	Normal soil	K-M-I	0	15	30	45	65	90	95	95	95	95	13.5
		M	0	20	50	65	75	90	90	90	90	90	16.0
		K-I	0	20	35	35	60	65	65	70	70	70	4.0
	0.2% NaCl	K-M-I	0	5	5	10	10	10	20	25	25	25	3.0
		M	0	0	0	0	0	0	0	0	0	0	0.0
		K-I	0	5	10	15	15	15	15	15	15	15	1.9
	0.4% NaCl	K-M-I	0	0	0	0	0	0	0	0	0	0	0.0
		M	0	0	0	0	0	0	0	0	0	0	0.0
		K-I	0	5	10	10	10	10	10	10	10	10	0.8
Tandaljo	Normal soil	K-M-I	0	0	15	30	40	60	85	85	85	85	1.3
		M	0	30	70	80	80	80	80	80	80	80	2.5
		K-I	0	15	40	60	80	80	80	80	80	80	3.5
	0.2% NaCl	K-M-I	0	0	0	0	25	40	90	90	90	90	0.9
		M	0	15	20	35	55	55	55	60	60	60	1.9
		K-I	0	20	35	55	55	60	60	60	60	60	1.9
	0.4% NaCl	K-M-I	0	0	0	35	55	55	70	85	85	85	0.4
		M	0	15	25	30	30	30	30	30	30	30	1.0
		K-I	0	15	35	55	55	55	55	55	55	55	0.8
Radish	Normal soil	K-M-I	5	5	10	35	45	65	75	85	90	90	9.8
		M	0	10	15	20	50	55	70	90	90	90	20.2
		K-I	0	0	0	10	30	45	75	75	80	80	6.3
	0.2% NaCl	K-M-I	0	0	0	0	0	0	0	0	0	0	0.0
		M	0	0	0	0	0	0	0	0	0	0	0.0
		K-I	0	0	0	0	0	0	0	0	0	0	0.0

Cont...

Seed	Soil	Clay type	Total seed germination (%) on the end of the day										Average shoot length (cm)
			1 st day	2 nd day	3 rd day	4 th day	5 th day	6 th day	7 th day	8 th day	9 th day	10 th day	
Bhindi	0.4% NaCl	K-M-I	0	0	0	0	0	0	0	0	0	0	0.0
		M	0	0	0	0	0	0	0	0	0	0	0.0
		K-I	0	0	0	0	0	0	0	0	0	0	0.0
	Normal soil	K-M-I	0	25	50	80	85	85	85	85	85	90	15.2
		M	0	20	55	55	55	85	85	85	90	90	17.8
		K-I	0	10	60	80	80	85	85	90	90	90	14.8
	0.2% NaCl	K-M-I	0	5	5	5	50	5	5	5	5	5	0.3
		M	0	0	0	0	15	10	0	0	0	0	0.0
		K-I	0	0	15	15	0	15	15	15	15	15	1.3
0.4% NaCl	K-M-I	0	0	0	0	0	0	0	0	0	0	0.0	
	M	0	0	0	0	0	0	0	0	0	0	0.0	
	K-I	0	0	0	0	0	0	0	0	0	0	0.0	

In the same pattern, for K-M-I type soil, the Brinjal is the most tolerant vegetable species than the other three species. In K-I type, Tandaljo exhibits germination in the range of 75% to 95% and hence, Tandaljo is the most tolerant than other vegetable species i.e. Radish and Bhindi.

Based on the observations, different vegetables can be placed in order of tolerance are as under -

For K-M-I type soil:

0.4% NaCl level: Tandaljo = Brinjal = Radish = Bhindi

0.2% NaCl level: Brinjal > Tandaljo > Bhindi > Radish

For M type soil:

0.4% NaCl level: Tandaljo > Brinjal = Radish = Bhindi

0.2% NaCl level: Tandaljo > Brinjal = Radish = Bhindi

For K-I type soil:

0.4% NaCl level: Tandaljo = Brinjal > Radish = Bhindi

0.2% NaCl level: Tandaljo = Brinjal > Bhindi > Radish

It can be concluded that various vegetable species are very highly susceptible to salinity of the soil. K-M-I soil gives better seeds germination in brinjal and tandaljo at 0.2% NaCl level.

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