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VALIDATION OF SEED GERMINATION PERCENTAGE AND ITS ATTRIBUTES FOR DIFFERENT VEGETABLES

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ABSTRACT

Seedsof tomato, muskmelon, watermelon, cucumber, ridge gourd and bottle gourd were sown in germination paper towel and pro-trays filled with coco-peat for germination testat Research and Development Farm, Mallasandra, Indigo Seeds Private Limited, Karnataka, in the month of July 2020 with an objective of validation of the seed germination percentage and associated attributes of different vegetables. All the seeds sown in cocopeat were germinated late than germination paper for all the vegetable crops except cucumber, which implies that the effect of environmental factors. The seeds of water melon and bottle gourd were germinated late in both the medium in comparison to other vegetable seeds. The seeds of cucumber germinated faster implies the role of physiology of the seed along with maintenance favourable conditions during germination. The seed germination varies with the change in growing medium. Therefore, it is necessary to sow the seeds in such a medium where itcan germinate with maximum potentiality.

Keywords : *Seed, germination, coco-peat, vegetables.*

Vegetable seed testing is most vital process which is required to judge the quality of seed of different lots offered for sale or storage. The quality characteristics that need to be assessed are seed germination percentage, seed moisture percentage, physical and genetic purity along with free from off type seeds and seed borne diseases.

Seed germination defined as the protrusion of theradicle from the tissue(s) enclosing it (1). Seed have an ability to develop into a normal plant under favourable conditions such asmoisture, temperature and oxygen. Quality of seed mainly depends on theseed testing protocols that validates geniusesof the varieties in respect of its physical, genetical and biochemical properties. In addition to this, speed of germination also matters which visualise the actual uniformity of the population (2). The germination test is most important because it may vary within population which effects the directly the potentiality of seed and key for establishment of plant.

Testing under field condition is vital to judge the seed vigour (ability of seed to emerge under stress condition), however,sometimes unsatisfactory also because of reliability on natural conditions such as hard soil surface, uneven irrigation etc. So, the testing under controlled condition is parallelly important to portrait the exact picture of seed potentiality. Germination in paper towel under controlled condition should also be done before sending the seed to the market for farmer. After purchase of seeds, most of the farmers are sowing the seeds in pro-traysusing fermentedcocopeat as a growth medium for commercial cultivation. Keeping the above points in mind, our prime objective is to calculate the germination percentage and associated attributes of different vegetables.

MATERIALS ANDMETHODS

The experiment was conducted at Research and Development Farm, Mallasandra, Indigo Seeds Private Limited, Karnataka, in the month of July 2020. The materials are collected from the stock maintained in the seed bank of Indigo Seeds Private Limited, Bangalore. Two hundred seeds each of tomato, muskmelon, watermelon, cucumber, ridge gourd and bottle gourd were sown in two mediums *i.e.,* germination paper towel (under controlled condition) and pro-trays filled with coco-peat(under shed house) for conduct of experiment. The materials are equipped with all the favourable conditions for precise result. Seed germination was recorded at every 2 days interval till the completion of germination.Germination per cent wascalculated by the following formula:

$$\text{Germination (\%)} = \frac{\text{Total cumulative germination}}{\text{Total number of seed sown}} \quad 100$$

Meandaily germination (%) was calculated by dividing the cumulative percentage of full seedgermination at the end of the test with numberof days from sowing to the end of the test. Completion ofgerminationwas taken fromthe day after which no furthergermination was noticed.

RESULTS AND DISCUSSION

Number of germinated seeds and germination percentage : The data of germinated seeds for different vegetables and its germination percentage under the both medium (germination paper and cocopeat) are presented in the Table-1. The data revealed that 156 tomato seeds were germinated in germination paper and 86.33 seeds in cocopeat after 4^{th} day of sowing with a germination percentage of 78.00 and 43.17, respectively. Maximum

Table-1 : Estimation of number of germinated seeds and germination percentage for different vegetables.

Crop	Medium	Number of germinated seeds					Germination percentage				
		2nd day	4th day	6th day	8th day	10th day	2nd day	4th day	6th day	8th day	10th day
Tomato	Germination Paper	0.00	156.00	168.00	186.00	186.00	0.00	78.00	84.00	93.00	93.00
	Cocopeat	0.00	86.33	140.67	173.33	178.00	0.00	43.17	70.33	86.67	89.00
Muskmelon	Germination Paper	0.00	146.67	180.67	180.67	180.67	0.00	73.33	90.33	90.33	90.33
	Cocopeat	0.00	123.33	156.67	179.33	179.33	0.00	61.67	78.33	89.67	89.67
Watermelon	Germination Paper	0.00	0.00	162.00	176.00	176.00	0.00	0.00	81.00	88.00	88.00
	Cocopeat	0.00	0.00	102.00	150.00	178.67	0.00	0.00	51.00	75.00	89.33
Cucumber	Germination Paper	0.00	195.33	196.00	196.00	196.00	0.00	97.67	98.00	98.00	98.00
	Cocopeat	0.00	167.35	198.64	198.64	198.64	0.00	83.67	99.32	99.32	99.32
Ridge Gourd	Germination Paper	0.00	144.67	190.67	190.67	190.67	0.00	72.33	95.33	95.33	95.33
	Cocopeat	0.00	107.33	171.33	197.28	197.28	0.00	53.67	85.67	98.64	98.64
Bottle gourd	Germination Paper	0.00	95.33	178.67	178.67	178.67	0.00	47.67	89.33	89.33	89.33
	Cocopeat	0.00	23.33	52.05	150.99	177.33	0.00	11.67	26.03	75.50	88.67

Table-2 : Results of Completion of germination (days), Mean daily germination percentage and associated attributes for different vegetables.

Crop	Medium	Completion of germination (days)	Mean daily germination percentage	Germination paper vs Cocopeat	
				Germination Days	Germination Percentage
Tomato	Germination Paper	8.00	23.25	2.00	20.00
	Cocopeat	10.00	17.80		
Muskmelon	Germination Paper	6.00	30.11	2.00	25.00
	Cocopeat	8.00	22.42		
Watermelon	Germination Paper	8.00	22.00	2.00	20.00
	Cocopeat	10.00	17.87		
Cucumber	Germination Paper	6.00	32.67	0.00	0.00
	Cocopeat	6.00	33.11		
Ridge Gourd	Germination Paper	6.00	31.78	2.00	25.00
	Cocopeat	8.00	24.66		
Bottle gourd	Germination Paper	6.00	29.78	4.00	40.00
	Cocopeat	10.00	17.73		

number of seeds germinated in 8th day of sowing recorded in case of germination paper with a germination percentage of 93.00.After 4th day of sowing, 146.67 seeds of muskmelon were germinated in germination paper and 123.33 seeds in cocopeat with a germination percentage of 73.33 and 61.67, respectively. Maximum days taken for number of germinated seed and germination percentage were found in cocopeat (8th day) and 6th day in germination paper. In watermelon, result showed that 162.00 and 102.00 seeds were germinated in 6th day after sowing in germination paper and cocopeat, respectively having a germination percentage of 81.00 and 51.00.In cucumber, 195.33 and 167.352 seeds were germinated in just 4th day of sowing in both medium with a germination percentage of 97.67 and 83.67, respectively which is minimum for all the crops. The ridge gourd and bottle gourd seeds germinated late just after watermelon, starts on 4th day with a percentage of 72.33 (germination paper), 53.67 (cocopeat) and 47.67 (germination paper), 11.67 (cocopeat), respectively due to its hard seed coat.

Completion of germination (days), mean daily germination percentage and associated attributes : The result forcompletion of germination (days), mean daily germination percentage and associated attributes were presented in table -2. It has been found that the germination of tomato seeds completed in 8 days in germination paper and 10 days in cocopeat. Likewise, other vegetable seeds also completed its germination in 6 days (muskmelon, cucumber ridge gourd and bottle gourd) and 8 days (watermelon) in germination paper. However, the seeds sown in cocopeat were germinated late in comparison to germination paper for all the vegetable crops except cucumber, which implies that the effect of factors such as temperature, moisture level, light intensity etc.

In germination paper, the mean daily germination percentage was recorded 23.25 for tomato, 30.11 for muskmelon, 22.00 for watermelon, 32.67 for cucumber, 31.78 for ridge gourd and 29.78 for bottle gourd. In cocopeat, the mean daily germination percentage was

observed 17.80, 22.42, 17.87, 33.11, 24.66 and 17.73 for tomato, muskmelon, watermelon, cucumber, ridge gourd and bottle gourd, respectively.

The difference between germination paper and Cocopeat for germination days and percentage have also been calculated and presented in table-2. From the result, it seems that the germination paper is superior than the cocopeat for all the tested vegetables. The maximum difference in germination days and percentage was recorded for bottle gourd (4.00 and 40.00) and minimum for cucumber (6.00 and 0.00). The seeds of cucumber germinated faster than all the vegetable seeds. This result reflects that there is the role of physiology of the seed coupled with maintenance of the required amount of favourable conditions throughout the germination period.

CONCLUSION

From the experiment, it can be concluded that the seeds are germinated early in germination paper than cocopeat. The seeds of cucumber germinated earliest followed by muskmelon, ridge gourd, bottle gourd, tomato and water melon after testing under controlled condition (germination paper) and shed house condition (portrays coco peat). In addition to this, the seed germination also variates under the different growing medium. So, the seeds should be sown in such a medium where we can get the maximum potentiality of the seed to get the precise quality of seed.

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