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Research Article

SEED HEALTH EVALUATION OF PEA VARIETIES BY PHYSICAL METHODS

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Abstract: Seed health evaluation was attempted for seed lots of different pea varieties *viz*., IPFD 10-12, Paras, Indira matar, KPMR 400, Shubhra, Ambika and local variety from randomly selected village by physical methods. In dry seed examination, seed lots of different pea varieties showed distinct variation in healthy seeds, damaged, discoloured, small/undersized, shrunken seeds, weed seeds and inert matters. Dry seed examination revealed that IPFD 10-12 variety showed highest purity where as local variety were recorded as least pure as compared to other pea varieties taken in the study. In washing test, maximum spore load was recorded from seed lot of local variety which include six spores of *Aspergillus flavus*, four spores of *Aspergillus niger*, two spores of *Aspergillus fumigatus*, one spore of *Trichoderma* sp, one spore of *Alternaria* sp, sevens pores of *Rhizopus* sp., one hyphal fragment of *Rhizoctonia* sp. and two spores of *Fusarium* sp. while Shubhra variety showed the minimum spore load among all the pea varieties taken in the study.

Keywords: Seed health, Pea, Physical methods

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Introduction

Pea (*Pisum sativum* L. Family- *Fabaceae*) is an important vegetable crop. It may also cultivated in temperate region at high elevation or during cool season in warm region throughout the world. It is mainly grown for its green pods and seeds. The seeds are highly nutritious as it contains about 22.5% protein, 64 mg/100g calcium, 1.8% fat, 4.8 mg/100g iron, 62.1% carbohydrate and 11% moisture. Seed is the most important and basic input for any crop. Availability of quality seed is the key for achieving a successful crop production. The fungi associated with seeds at the stage of harvest, transport, processing and under storage bring about several undesirable changes, making them unfit for consumption and sowing contaminated seeds can often result in poor germination and poor seedling vigour, resulting in an un-healthy crop. Physically viable and healthy seeds are main and primary segment of economically higher production of the crop. Presence of varieties of proteins, carbohydrates and oil in pulse crop makes its seeds liable to attack by ranges of seed borne pathogens. These pathogen causes pre and post emergence losses and disease at various stages of crop growth, finally resulting in the reduction of yield and deterioration of seed quality besides producing symptoms at seedling and foliage stages and also spoiled the quantity of seed during storage. Seed mycoflora play an important role in determining the quality and longevity of seed. Seeds are generally associated with certain saprophytic or parasitic micro-organisms which perpetuate in the seed lots on the advent of favourable conditions. An attempt was made for pea seed health evaluation by physical methods.

Materials and Methods

Dry seed examination

Inspection of dry seed can be applied to detect seed borne mycoflora when present in the seed may cause discoloration of seed coat or changes in the seed size or shape. The seed sample (300 gm) was first examined by naked eyes, followed by magnifying lens and then under stereoscopic binocular microscope to record observations on the mixture of seeds, healthy, discoloured, damaged seed, weed seeds, plant parts, inert matter, fraction such as soil, sand and stones, malformations, fungal bodies *etc*

Washing test

Washing test was performed to detect and identify the spores adhered on seed surface. Two grams of seed from working sample was taken in a test tube with 10 ml of sterile distilled water and shaken for 10 minutes on a mechanical shakertore move the adhering parts of organism from the seeds. Suspended spores were concentrated by centrifuging at 3000 rpm for 15-20 minutes. The supernatant was discarded and the pellets used to make serial dilution of spore suspension. In serial dilution for seven samples, arrange 21 test tubes in are won test tube stand and fill all with 9 ml of sterilized distilled water. Add 1 ml of stock spore suspension in each test tube containing9mlofdistilled watertogive10-1 dilution of fungal spores. Label it, mix thoroughly and add 1 ml of 10-1 dilution to the next tube containing 9 ml of distilled water to give 10-2 dilution in second dilution. These spore suspensions spread on PDA poured plates of each dilution in three replicated plates. These plates were incubated at 22±1ºC under a 12-hour dark and light cycle with NUV light for 4-5 days. Observations were recorded to identify mycoflora with help of microscope and expressed in terms of spore load count.

Result and Discussion

Dry seed examination

Dry seed examination revealed the status of damaged seeds, discoloured seeds, small/undersize seeds, shrunken seeds, inert matters, weed seeds and healthy seeds in seed lots. Pea seed lots of different varieties were collected from AICRPon MULLaRP, Department of Genetics and Plant Breeding, IGKV Raipur and one variety was collected from farmer of randomly selected village. These varieties were IPFD 10-12, KPMR 400, Shubhra, Paras, Ambika, Indira matar and local variety. Data presented in [Table-1] showed that healthy seeds were maximum in IPFD 10-12 (94.21%) variety followed by Shubhra (86.4%), Paras (83.5%), Indira matar (83.04%), KPMR 400 (83%) and Ambika (74.27%). Least percentage of healthy seed was recorded in local variety (29.85%). Maximum percentages of damaged seeds were recorded in seed lot of local variety (1.95%)

Table-1 Seed health evaluation of different varieties of pea by dry seed examination

SN	Varieties	Damaged seed (%)	Discoloured seed (%)	Small / Undersizeds seed (%)	Shrunken seed (%)	Inert matter (%)	Weed seed (%)	Healthy seeds (%)
1	IPFD 10-12	0.7	0.35	1.17	3.5	0.02	0.04	94.21
2	Paras	1.12	1.12	3.76	8.45	1.86	0.18	83.5
3	KPMR 400	1.69	0.24	1.27	12.87	0.17	0.75	83
4	Indira matar	1.58	4.65	0.61	7.5	1.56	1.05	83.04
5	Shubhra	0.81	0.43	3.43	8.35	0.32	0.25	86.4
6	Ambika	1.8	0.3	2.65	20.57	0.35	0.05	74.27
7	Local variety	1.95	1.3	1.1	53.6	4.65	7.55	29.85

Table-2 Spore load of seed borne mycoflora on pea seed lots (washing test)

SN	Varieties	Number OF CFU (X 10 ^{2})								
		A.flavus	*A.niger*	*A.fumigatus*	*Trichoderma* sp.	*Alternaria* sp.	*Rhizopus* sp.	*Rhizoctonia* sp.	*Fusarium* sp.	Total CFU(x10^2)
1	IPFD 10-12	2	2	-	-	3	4	-	-	11
2	Paras	2	1	-	-	-	1	-	-	4
3	KPMR 400	3	5	-	1	2	5	-	1	17
4	Indira matar	2	2	-	-	1	3	-	-	8
5	Shubhra	1	-	-	-	-	2	-	-	3
6	Ambika	4	3	-	1	2	7	-	2	19
7	Local variety	6	4	2	1	1	7	1	2	24
Total mycoflora		20	17	2	3	9	29	1	5	

and minimum in IPFD 10-12 (0.7%) variety. Maximum percentages of discoloured seeds were found in seed lot of Indira matar (4.65%) and minimum in KPMR 400 (0.24%). Small/ under sized seeds were maximum in seed lot of Paras (3.76%) and minimum in Indiramatar (0.61%) seedlot. Percentages of shrunken seeds were maximum in local variety (53.6%) and minimum in seed lot of IPFD 10-12 (3.50%). Maximum percentage of inert matters was recorded in local variety (4.65%) and minimum in IPFD 10-12 (0.02%). Maximum weed seeds were recorded in local variety (7.55%) and minimum in IPFD 10-12(0.04%). Hence, among all the pea varieties IPFD10-12 variety showed highest purity as compared to other pea varieties taken in the study and local variety were recorded as least pure among all the varieties. Many seed borne micro-organisms were capable of causing discolouration, shriveling, distortions, spotting and stromatisation of seeds which were visible to the naked eye and this was the concern to the growers. Variation in purity standard in general and pea in particular depends on cropping situation, processing and storage *etc.* Variation in purity of pea [1-4] supports the finding of present study. Purity of seed lots of legumes vary considerably in pigeonpea [5,6]; in mungbean [7-9]; in chickpea [10-12].

Washing test

Washing test was performed to know the spore load present on pea seedlots and data presented in [Table-2] indicates that maximum spore load was recorded from seed lot of local variety *i.e.*, 24x10^2 which include six spores of *Aspergillus flavus*, four spores of *Aspergillus niger*, two spores of *Aspergillus fumigatus*, one spore of *Trichoderma* sp, one spore of *Alternaria* sp, seven spores of *Rhizopus* sp., one hyphal fragment of *Rhizoctonia* sp. and two spores of *Fusarium* sp. This was followed by seed lot of Ambika (19x10^2), KPMR 400 (17x10^2), IPFD 10-12 (11x10^2), Indira matar (8x10^2), Paras (4x10^2) and minimum spore load was recorded in Shubhra (3x10^2) variety. Overall, predominant mycoflora with maximum spore load were *Rhizopus* sp. followed by *Aspergillus flavus* and *Aspergillus niger* across all varieties of pea. Other mycoflora were found as *Alternaria* sp., *Fusarium* sp., *Trichoderma* sp. and *Aspergillus fumigatus* with varying numbers of spores *i.e.*, nine, five, three and two respectively. Only one hyphal fragment of *Rhizoctonia* sp. were found across the varieties. In this method, local variety showed maximum spore load, while Shubhra variety showed the minimum spore load among all the pea varieties taken in the study. *Rhizopus* sp. were the most dominant mycoflora in all varieties of pea, whereas *Rhizoctonia* sp. was present only in local variety. Mycoflora adhered on surface of seeds were detected in this method. Mycoflora found associated with pea seeds in the present study were also reported. The mycoflora associated with legumes in varying frequencies [13]. The mycoflora found adhered with chickpea seeds by this method [14]. the variation in the frequency of adhered mycoflora on seed lots of mungbean collected from various districts of agro-climatic zones of Chhattisgarh also reported. High frequencies of mycoflora in local variety of chickpea than the other varieties used in study which confers the finding of this study.

Application of Research: Findings of present investigation are useful in evaluating purity status of seeds.

Research Category: Seed health

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