

**ORIGINAL ARTICLE****Production of Pathogen Free Seed Samples of Ornamental Plants****K.K. Singh**

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Email: kksinghdr@yahoo.co.inReceived: 5th Jan. 2017, Revised: 15th Jan. 2017, Accepted: 18th Jan. 2017**INTRODUCTION**

Ornamental annuals grown for flowers specially pansy (*Viola tricolor*) verbena (*Verbena hybrida*), cosmos (*Cosmos sulphureus*) and Zinnia (*Zinnia elegans*) are the choicest varieties which adorn almost every garden, park and public place. Like any other crop seeds, ornamentals are also subjected to the vagaries of climate, mechanical injuries and to the attack of organisms, all of which result ultimately in reducing its commercial value. The flowering seeds are also the source of dispersal of inoculum across the international or interstate boundaries and thus need a thorough seed health testing to the satisfaction of plant quarantine legislation. With these objectives the seeds of the ornamental plants selected for the present investigation of the seed disorders and associated organisms were collected from the different localities varying in agro climatic conditions. Thus seed samples were procured from different places as Srinagar (J & K), Simla (H.P.), Amritsar (Punjab) Sonapat (Haryana), Saharanpur (U.P.), Jabalpur (M.P.), Calcutta (W.B.), Poona (Maharashtra), Cuttack (Orissa) and Madras (T.N.).

MATERIALS AND METHODS

According to the international seed testing Association Rules (Anonymous, 1966), the seed samples, each containing 400 seeds were examined with the naked eye and under 45 X - 60X magnification of stereobinocular for sclerotia, pycnidia, smut balls, discoloration, other fructifications and associated contaminants and disorders. The recorded observations are given below:

1. Seed samples were found to contain deformed, damaged, discolored and blemished seeds. In a few seeds of pansy micropylar and was found blackish. The seed lots were found contaminated with the inert matter, like floral parts, stem and leaf bits, soil and humus particles, insect eggs etc. Some seed lots had mycelial bits and other fructifications in the depression or micropylar end. The pycnidia were found adhering to the seeds of pansy from Amritsar and verbena collected from Srinagar, Sonapat, Saharanpur, Jabalpur and Cuttack. The seed lots of zinnia collected from Agra, Simla, Saharanpur and Madras were also found infected with pycnidia.
2. The percentage of damaged, deformed, discoloured seeds and the inert matter in the seed samples varies from place to place and with the type of seed. The seed lots of cosmos with smooth surfaced seeds were found less contaminated and had very low percentage of unhealthy seeds. The verbena seeds (rough surface) were second and pansy seed lots having white sticky gum like substance over the surface of seeds, were the third in order. The seeds of zinnia with hairy surface were found to be heavily contaminated and showed a considerable percentage of seed defects and disorders.
3. The seed samples from Calcutta and Poona had the lowest percentage of damages, deformed and contaminated seeds where as those from Agra, Srinagar, Amritsar, Sonapat, Sharanpur and Jabalpur had high percentage of disorders and varied slightly among each other's. The seed lots obtained from Amritsar for all the four types of seed were most highly contaminated.
4. The seeds which showed discoloration and blemishes were found to be thin and light in weight.

OBSERVATIONS

The apparently infected seeds and the associated contaminants with seed lots, which were observed during dry examination, were incubated on moist blotter to record their role in seed health testing. The observations are as under:

1. The seeds with discoloration of seed coat of pericarp in blackish colour showed the presence of *Alternaria* spp. (*A. alternate* and *A. zinnia*) in 65 percent and *Curvularia* in *Cochliobolus lunatus* in 27 percent of seeds. The greenish colour of pericarp in verbena and zinnia showed the 90 percent of *Aspergillus flavus*.
2. The mycelial bits observed in dry examination of verbena seeds were of *Cephalophora irregularis* up to 84 percent and *Fusarium semitectum* up to 9 percent. In case of zinnia *Asperillus* spp. (*A. flavus* and *A. sydowii*) observed on the surface of about 65 percent seeds.
3. The seeds with black blemishes on seed coat and pericarp showed the presence of 70 percent *Drechslera* spp. (*Drechslera* state of *Cochliobolus spicifer* and *D. hawaiiensis*), about 5-10 percent *Alternaria alternata* and 5-8 percent *Curvularia* state of *Cochliobolus lunatus*.
4. The pycnidia associated with the seeds of pansy and verbena during dry examination was found to be of *Phoma glomerata*.
5. The order fructifications associated with the seeds were found to be of *Aspergillus flavus*, *A. niger*, *Penicillium chrysogenum*, *Rhizopus stolonifer* and *Mucor mucedo*.
6. At the blackish micropylar end of pansy seeds. 76 percent *Alternaria alternata* and 30 percent *Curvularia* state of *Cochliobolus lunatus* were recorded.
7. Incubation of deformed seeds showed the presence of 40-60 per cent *Aspergillus* spp., 10-30 per cent *Rhizopus stolonifer* and 5-7 per cent *Fusarium* spp. (*F. equiseti*, *F. moniliforme* and *F. semitectum*).

The contaminants of seed lots were found contaminated with *Alternaria alternata*, *Alternaria zinniae*, *Aspergillus* spp. *Cladosporium* spp., *Curvularia* state of *Cochliobolus lunatus*, *Drechslera* state of *Cochliobolus spicifer*, *Rhizopus stolonifer* and *Fusarium* spp., when incubated on moist blotter.

CONCLUSION

The observations lead to the conclusion that contaminants, seed defects and disorders vary in each seed type depending upon the place of production of seed. The texture of seed surface also plays a significant role in the process of carrying the inoculum. The low degree of seed deformation and infection in the samples of Calcutta and Poona may be due to proper cleaning and packing of seed, as they were procured from renowned firms, whereas the others seed lots were purchased from untrained seed growers.

RECOMMENDATIONS

On the basis of results of the present study the following recommendations can be made for seed-certification from the point of view of seed health :

1. Seed samples of the ornamentals seed must be examined to detect the number of discolored, deformed, damaged and infected seeds besides the presence of sclerotia pycnidia and other inert contaminants.
2. Seed samples should be cleaned and careful examination of hairy and grooved surfaced seeds, in order to free it from impurities, mycelial bits, infections and other contaminants, should be made.
3. The seeds must be collected during harvest from the apparently healthy and disease free plants. The seeds of the infected plants in the field hold more inoculum.

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REFERENCES

1. Anonymous (1966): International Rules for seed Testing. Proc. Int. seed Test. Assoc. 31: 1-152.