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Research Review

Principles and Quality Parameters for Seed Certification in Some Important Seed Spice Crops

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A B S T R A C T

Seed is the critical and basic input for attaining production and productivity of any crop. Without the use of good quality seed material, the investments incurred on fertilizers, pesticides, water and other inputs are in vain. There has been considerable coverage of area under seed spices but its share towards production is less, the main cause towards this low productivity is non-availability of quality seed and released varieties. Seed certification aims to legal system in quality control of production and multiplication of any seed crop, to check the crop from which the seed is produced and link this verification with agreed minimum standards which are also called Indian Minimum Seed Certification standards. The quality seed of seed spices have become the pre-requisite in successful raising, increasing the production and productivity of these crops, which is possible only through required information on seed certification standards particularly the field standards and seed standards. In field standards the isolation distance requirement in coriander, cumin, fennel, ajowain, celery and dill ranges from 100-400 m in certified class and 200-8000 m in foundation class as these crops are cross pollinated whereas fenugreek, and black cumin requires 25m and 50 m in foundation and certified class respectively because these are self-pollinated to often cross-pollinated crops. For seed standards of these seed spices the off type, objectionable weed seeds and diseased plants in foundation and certified class ranges from 0.10 - 0.20%, 0.01- 0.02% and 0.10-0.50% respectively. The other certification standards like objectionable weeds, designated seed borne diseases and other diseases are different and crop specific.

***Key words*:** Certification standards, Isolation distance, Seed quality standards, Seed spices

India is well known the world over as "Home or Land of Spices". The reason is as the quality of spices produced and exported from India have been and continue to be undisputedly one of the best [1]. The country is blessed with the different agro-climatic conditions which are tropical, subtropical and temperate zones which led the advantageous position to produce large and different kind of seed spice crops, no other country in the world has such a broad and dynamic supply system of seed spices. The climatic conditions prevailing in Rajasthan, Gujarat and some other adjoining states in arid and semi-arid regions are very much conducive for growth and development of wide range of seed spice on the other hand the best suitable climatic conditions suitable for growth and development of Kala Zeera is Jammu and Kashmir and Ladakh [2]. India is exporting about 14 percent of its seed spices production annually and full fill nearly 50% of world demand. The total export of seed spice crops is about Rs. 3.7 thousand crore, out of which cumin alone contribute 2.41 thousand crore (Spice Bord of India 2017-18) Seed spices are the crops having seed as a main economic part and used for imparting flavor, aroma, value addition and pungency to food. Other than the culinary the seed spices are used widely in pharma and other industries for carminative and preservative purposes. The major seed spice crops grown in India are Cumin, Coriander, Fenugreek, Fennel, Ajowain, Dill, Celery, Anise and Black Cumin [3].

There has been considerable coverage of area under seed spices but its share towards production is less, the main cause towards this low productivity is non-availability of quality seed, less attention towards maintenance of standards during seed production and non-availability of released varieties. Seed is the critical and basic input for attaining production and productivity of any crop, without the use of good quality seed material, the investments incurred on fertilizers, pesticides, water and other inputs are in vain. Seed certification aims to legal system in quality control of production and multiplication of any seed crop. Certification system is a programme to maintain and make available to the public, high quality seed and propagating

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materials of genetically distinct crop varieties. It has become especially important for seed spice crops because most of varieties are traditionally grown and their seed is sold in open market. By adopting the use of certified seed there are many benefits to average farmers, that it provides access to seed of excellent varieties with good assurance of high genetic purity, thus helps avoid unnecessary loss in yield from planting seed of unknown or contaminated varieties. Similarly, certified seed which is high in mechanical purity provides assurance to the user against the introduction of weeds, diseases or other crops seed contamination Armstrong [4].

Moreover, as per the report of National Research Centre on Seed Spices (NRCSS) 2015-16 so for only 61 varieties of nine different seed spice crops have been released which are limited to only few states and even reached to fewer farmers. the seed spice crops have not received attention in national seed production policies. The quality seed and systemic increase of varieties are the main components for increasing the production as well the productivity of any crop as well as in seed spices and these two component parameters require information on seed certification standards particularly the field standards and seed standards [5].

Seed certification standards of seed spices

As per the provisions under Seed act 1966, Seed certification is legally sanctioned system of quality control of seeds during production, multiplication and distribution stages or until it reaches to the farmer. The objectives of seed certification is the systemic increase of varieties of crops, identification of new varieties and their rapid increase in appropriate and acceptable manner and establishment of systems to check and balance the quality of seed during distribution Vanangamudi *et al.* [6]. On the other hand, seed certification is to ensure the genuineness of seed during the multiplication chain till it reaches to final consumer or farmer, a well-organized seed certification programme may, in theory and actually does in fact, become the guardian of pure good quality seed supply, seed is not like any other commercial product. The seed problem is much more complicated, because in every seed there is the possibility of good or bad quality or high or low yield, depending up on the breeding behind it. The real value of seed cannot be determined entirely by its weight, its appearance or mechanical conditions. Of equal importance is the breeding, the germ of life, that is represented in the bulk of golden grain, which may or may not look like many other lots. It is this distinguishable value which is placed in the variety or kind of seed by the breeder which the seed certification endeavors to perpetuate through the principles of seeds certification standards maintained during the multiplication programme.

These quality control measures which provide the standards for seed certification and labeling of the seed lot in accordance to the class of seed are called minimum seed certification standards or minimum conditions which a crop must met. These standards are field standards and Seed standards.

(A) *Field standards of seed spice crops*

The major operations that are considered very important for minimum field standards for any crop or seed spice crops are Preceding Crop (land requirement), Isolation distance and field inspections [5].

(i). *Preceding crop (land requirement)*: land intended for seed production must be free from volunteer plants and field must have not been under same crop in previous season.

(ii). *Isolation distance*: Minimum isolation distance have been specified to minimize genetic contamination and seed borne diseases from the neighboring fields of same crop of different varieties. Isolation distance is one of the critical factor to be ensured during the seed production system to maintain the genuineness or true to type of a variety or kind. The seed spices like coriander, cumin, fennel and ajowain belongs to family Apiaceae are mostly cross pollinated by insects(entomophilous) whereas fenugreek, dill and black cumin are self-pollinated but cross pollination also takes place upto some percentile [6-7]. The isolation distance to be kept from the fields of different varieties for foundation and certified are given in (Table 1).

(iii). *Field inspections*: The field inspections are meant to verify the factors which can cause damage to the genetic purity or seed health. These inspections are conducted by the persons authorized by seed certification agency normally comprise the team of seed production officers and seed spice breeder with prior notice to seed producer. The stages of crop at which inspections are done vary with the nature of crop and plant habit (Annual, Biennial or perennial) mostly as minimum two to three field inspections are made during the growing stages:

Table 1 Minimum isolation distance requirement for seed spices

Name of the crop	Pollination mechanism	Isolation distance requirement (m)	
		Foundation seed	Certified seed
Fenugreek	Self-pollinated	50	25
Coriander	Cross-pollinated	200	100
Cumin	Cross pollinated	800	400
Fennel	Cross pollinated	200	100
Ajowain	Cross pollinated	200	100
Dill	Cross-pollinated	200	100
Celery	Cross-pollinated	500	300
Black cumin (Kala Zeera)	Often-cross pollinated	50	25

(a). *Before flowering*: This is the first done before flowering to determine isolation, planting ratio, volunteer plants, designated diseases and relevant factors.

(b). *At flowering and seed setting*: This is conducted during the flowering to rouge early flower type, plants showing different flowering behavior, off type, designated diseases and other relevant factors.

(c). *Before harvesting*: The 3rd inspection is done at maturity to verify designated diseases, true nature of plant, umbels, characteristic of seeds and confirmation of removal of off types.

Table 2 Number of field visits, minimum off type permitted, objectionable weeds, and designated diseases in seed spices

Name of the crop	Minimum field visits	Min. off-type plants permissible		Objectionable weeds	Designated diseases
		Foundation	Certified		
Fenugreek (Annual)	03	0.10	0.50	*Melilotus, Chenopodium,*	Root rot, Downey mildew, Leaf Spot, Powdery Mildew
Coriander (Annual)	03	0.10	0.50	*Chenopodium* murale, *lathyrus*	Fasrium wilt, Stem gall, Powdery and Downey mildew
Cumin (Annual)	03	0.10	0.20	*Plantago pumila* (Jiri), Rumix	Fusarium wilt, Cumin blight, Powdery mildew
Fennel (Perennial)	02	0.10	0.50	*Eleusine indica, Dactyloctenium.*	Alternaria blight, Ramularia blight
Ajowain (Perennial)	02	0.10	0.50	*Cyperus rotundus, Digera arvennis, Ammi majus*	Collar rot, root rot, Blight
Dill (Perennial)	02	0.10	0.50	*Amaranthus, Datura stramonium*	Root rot
Celery (Biennial)	03	0.10	0.20	Barnyard grass, *Poa annua*	Yellow virus
Black cumin (Perennial)	02	0.10	0.50	*Vernonia cinerea, Cirsium arvense*	Tuber rot, Neck rot, Leaf blight, Stem rot

(B) *Standards of seed in spice crops*

This requires lot of planning and efforts from the Government as well as production and marketing agencies to maintain and preserve the seed quality of spice crops to the highest possible standards. Seed spice crop are harvested, threshed and processed after meeting the field standards as per the guidelines issued by the certification agency. Soon after the completion of seed processing the composite sample is taken for analysis of seed standards [8-9]. The minimum seed standards for certification of seed spice crops like pure seed, inert matter, other crop seed, total weed seed, germination and other parameters are given in (Table 3).

Table 3 Minimum seed standards of spice crops

Name of the crop	Seed standards (%)											
	Pure seed (Minimum %)		Innert matter (Maximum %)		Other crop seed /kg		Total weed seed/kg		Germination (%)		Moisture (%)	
	F	C	F	C	F	C	F	C	F	C	F	C
Fenugreek	98	98	2	2	10	10	10	10	70	70	8	8
Coriander	98	97	3	3	10	20	10	20	65	65	10	10
Cumin	97	97	3	5	10	20	10	20	65	65	10	10
Fennel	97	95	3	3	10	20	10	20	65	65	10	10
Ajowain	97	95	3	3	10	20	10	20	65	65	10	10
Dill	97	97	3	5	10	20	10	20	65	65	8	8
Celery	97	97	3	5	5	10	5	10	70	70	8	8
Black Cumin (Kala Zeera)	98	97	3	3	5	10	5	10	45	45	8	8

C = Certified
F = Foundation

There is little knowledge about the certification standards of black cumin, The efforts have been made to collect all the research information, like pollination mechanism, diseases, weeds, production process, seed quality parameters to prepare a reference guide line for spice workers about this crop till the Central Seed Certification Board will approve the certification Standards for this crop [10].

CONCLUSION

India has always been known as the land of spices. Seed spices constitute an important group of agriculture commodities and play an important role in our national economy. India is exporting about 14 percent of its seed spices production annually and full fill nearly 50% of world demand. The total export of seed spice crops is about Rs. 3.7 thousand crores. The major seed spice crops grown in India are Cumin, Coriander, Fenugreek, Fennel, Ajowain, Dill, Celery, Anise and Black Cumin. Seed is the critical and basic input for attaining production and productivity of any crop. Without the use of good quality seed material, the investments incurred on fertilizers, pesticides, water and other inputs are in vain. The seed quality control measures are stipulated to provide the standards for seed certification. The quality seed of seed spices

have become the pre-requisite in successful raising of these crops which requires information on seed certification standards particularly field standards and seed standards. Isolation distance, stages of field inspections and minimum number of these inspections, objectionable weeds, designated diseases and minimum seed standards which include purity percentage, germination percentage and other parameters constitute principles of seed certification for quality seed production of seed spices crops.

LITERATURE CITED

1. Rathore SN, Balraj S. 2013. Potential benefits of seed spices. *Internal Journal of Seed Spices* 3(2): 1-12.
2. Gupta JP, Joshi DC, Singh GB. 2000. Management of Arid Agro ecosystem. *In*: Natural Resources Management for Agriculture production in India. Proc. Intern. Conf. On managing natural resources for sustainable production of agriculture production in 21st Centaury, held during Feb, 14-18,2000 India. (Eds) Yadav JPS and Singh GB. Indian Society of Soil Science, New Delhi. pp 551-653.
3. Lal G. 2018. Scenario, importance and prospectus of seed spices. *A review. Current Investigation in Agriculture and Current Research* 4(2): 491-496.
4 Armstrong J. 1994. The role of certified seed in the twenty-first century. Presented at the 1994 Annual Meeting of Association of Official Seed Certifying Agencies, Fort Mitchell, Kentucky.
5. Malhotra SK. 2006. Celery. Chapter *In*: (Eds.) Peter K. V. *Handbook of Herbs and Spices* Vol. 3. Woodhead Publisher U.K. pp 317-336.
6. Vanangamudi K, Nagrajan N, Bharathi A, Natesan P, Jerlin R, Nagrajan K, Saravanan T. 2006. *Recent Techniques and Participatory Approaches on Quality Seed Production*. Kalyani Publications. Edition-I: 360-64
7. Babu PH. 2017. Export performance of spices in India: An empirical study. *Parikalpana, IIT Journal of Management*. pp 66-74.
8. Malhotra SK, Vijay OP. 2003. Plant genetic resources seed spices in India. *Seed Spices Newsletter* 3(1): 1-4.
9. Sofi PA, Zeerak NA, Singh P. 2009. Kala zeera (*Bunium persicum*): A Kashmirian high value crop. *Turk Journal of Biology* 33: 249-258.
10. Patel PN, Prasad N, Mathur RL, Mathur BL. 1957. Fusarium wilt of cumin. *Current Science* 26: 181-182.