Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6277

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (1):** 774-778 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Screening of Cauliflower Genotypes against Economically Important Diseases and Disorder in Mid Hilly Regions of Himachal Pradesh

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Received: 15.01.2018 | Revised: 22.02.2018 | Accepted: 25.02.2018

ABSTRACT

Cauliflower is the popular most 'cole' crop in India. It is cultivated almost throughout the country particularly during the winter months. Himachal Pradesh is a very potent cauliflower growing state and productivity is higher than national average. There are some important diseases like stalk rot and black rot and disorder like riceyness which significantly reduces the yield, market value of curd, consumer's acceptibility and creates a limitation in profitable cauliflower cultivation in this province. So that, twenty genotypes of mid late and late group cauliflower were evaluated for their response towards stalk rot, black rot and Riceyness during Rabi season of 2016 at the Experimental Farm of the Department of Vegetable Science, Dr. YS Parmar University of Horticulture and Forestry, Solan, Himachal Pradesh. The analysis of variance revealed highly significant differences among all the genotypes for their response to the diseases. Among all the genotypes studied, DC-76 reflected minimum (3.95%) stalk rot incidence whereas Pusa Snowball K-1 showed minimum (11.03%) black rot severity. In the current study majority of the genotypes were found to produce non ricey curds.

Key words: *Cauliflower, Diseases and Disorder, Black rot, Stalk rot, Riceyness.*

INTRODUCTION

Cauliflower (*Brassica oleracea* var. *botrytis* L.) is considered as the second most popular 'cole' crop in the world after cabbage but in Indian perspective it is popular most. It is commercially grown for its 'curd' which is a peculiar type of inflorescence consisting of thick, fleshy, strongly ramified flower stalks Nieuwhof[7]. Curds are used as sauted or fried vegetable either separately or with potato, peas, capsicum or other vegetables. It is also cooked in curry and sambhar Swarup[11].

Mid hilly and hilly regions of Himachal Pradesh are very potent zone for producing mid-late and late type cauliflowers. The average productivity of this crop in this state is 23.41 t/ ha which surpasses the national average productivity i.e. 18.79 t/ ha Annonymous[2].

Cite this article: Chatterjee, S., Mukherjee, D., Patil, S.B., Kanwar, H.S., Kanwar, H.S. and Choudhuri, P., Screening of Cauliflower Genotypes against Economically Important Diseases and Disorder in Mid Hilly Regions of Himachal Pradesh, *Int. J. Pure App. Biosci.* **6(1):** 774-778 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6277

But diseases like stalk rot and black rot and disorder like Riceyness are the major limiting factor for profitable cauliflower production in this zone. Each and every year farmers of this state face a significant yield loss of cauliflower due to these factors.

Though some cultural and biological practices are there to control stalk rot disease which is caused by fungus but these are proved not so much effective. The uses of commercially available chemicals are neither cost effective nor safe to environment. Whereas, plant once infected with black rot can't be returned to healthy condition further because it is a bacterial disease. Riceyness is the most destructive disorder which makes the curd unattractive to the consumers and reduces the market value. Therefore, the most effective way to get rid of these fatal diseases and disorder is to use resistant varieties or hybrids. So that, the objective of this study was to screen available cauliflower germplasm against these maladies under natural conditions.

MATERIALS AND METHODS

The experiment was laid out in randomized complete block design with three replications at the Experimental Research Farm, Department of Vegetable Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh during Rabi season of 2016. The experimental material comprised of twenty indigenous and exotic mid-late and late cauliflower genotypes (Table 1) including commercial check Pusa Snowball K-1 (PSBK-1). Standard cultural practices were followed for raising healthy crop of cauliflower Annonymous[1].

Table 1: List of cauliflower genotypes along with their sources

Sr no	Genotype	Source
1.	UHF-C-2	Dr YSPUHF, Nauni, Solan
2.	Palam Uphar	CSKHPKV, Palampur
3.	King King	HRI, Wellesbourne, UK
4.	Pusa Himjyoti	IARI, Katrain
5.	EC-683466	NBPGR, New Delhi
6.	EC-683461	NBPGR, New Delhi
7.	EC-162587	NBPGR, New Delhi
8.	Hermia	HRI, Wellesbourne, UK
9.	Kt-18	IARI, Katrain
10.	Kt-25	IARI, Katrain
11.	Kt-19	IARI, Katrain
12.	Kt-20	IARI, Katrain
13.	Kt-22	IARI, Katrain
14.	Mukutamani	IARI, Katrain
15.	Sel-I	Dr YSPUHF, Nauni, Solan
16.	Sel-II	Dr YSPUHF, Nauni, Solan
17.	DC-76	IARI, New Delhi
18.	Pant Shubhra	GBPUAT, Pantnagar, Uttarakhand
19.	Snowball-16	IARI, Katrain
20.	PSBK-I (Check)	IARI, Katrain

Stalk rot incidence (%):

The stalk rot incidence was recorded on leaves under natural epiphytotic conditions. The observations were recorded on number of leaves showing disease symptoms and total number of leaves on each plant in a plot, at weekly intervals. Finally the data were cumulated and expressed as per cent stalk rot incidence as per the method given by Dohroo[4].

$$\text{Disease incidence (\%)} = \frac{\text{Number of diseased leaves}}{\text{Total number of leaves per plant}} \times 100$$

Based on the per cent disease incidence, the ratings were made as follows:

Scale/grade	Disease incidence (%)	Reaction
1.	0-10	Resistant
2.	11-20	Moderately Resistant (MR)
3.	21-40	Susceptible (S)
4.	>40	Highly Susceptible (HS)

Black rot severity (%):

For evaluating resistance against black rot [*Xanthomonas campestris* pv. *campestris* (Pam.) Dowson], the severity was recorded on leaves showing the disease symptoms under natural epiphytotic conditions. The individual plants were scored 0-9 IP scale as suggested by William *et al*. [12].

Disease rating	Description
0	No external symptoms
1	Marginal necrosis of the leaf
3	Small V- shaped lesions on the leaf
5	V- shaped lesions extending upto half of the leaf area
7	V- shaped lesions extending often upto mid rib
9	Seedling death, severe chlorosis and necrosis of leaf

The disease was recorded at weekly interval and the data obtained was converted to per cent disease severity. The genotypes were classified into resistant (0-10%), moderately resistant (11-20%), and susceptible (>20%).

$$\text{Disease severity (\%)} = \frac{\text{Sum of all disease rating}}{\text{Total number of rating x maximum disease grade}} \times 100$$

The data recorded were subjected to analysis of variance as per procedure described by Gomez and Gomez[5].

Riceyness:

It was observed visually and varieties grouped into two categories i.e. ricey and non ricey

RESULTS AND DISCUSSION

Stalk rot incidence:

The perusal of data recorded the significantly varied response to stalk rot among the different 20 genotypes under study (Table 2). The genotype namely DC-76 (3.95%) reflected minimum disease incidence. No genotype was found to be affected or highly affected by this disease. The same was also reported by Pathania[8] who also not found any susceptible germplasm under field condition. Thirteen genotypes namely DC-76 (3.95%), Pusa Himjyoti (5.36%), PSBK-I (5.52%), King King (5.78%), Pant Shubhra (6.80%), Kt-25 (6.95%), Mukutamani (7.40%), Sel-II (7.42%), EC-683461 (7.95%), Kt-19 (8.07%), UHF-C-2 (8.36%), Hermia (8.43%) and Kt-22 (9.91%) were categorized as resistant varieties (<10%) whereas remaining seven genotypes are classified as moderately resistant varieties (10-20%) under field condition. The result was in line with the findings of Singh *et al.*[10], Kanwar *et al*. [6] and Sharma[9].

Black rot severity:

A wide range of variability was recorded for this trait among the twenty genotypes under study (Table 2). The genotype namely PSBK-I (11.03%) reflected minimum disease incidence. Total eleven number of genotypes including commercial check PSBK-I were classified as moderately resistant (11-20%), whereas other nine genotypes were categorized as susceptible varieties (>20%)

under field condition. No variety was found which was completely resistant for this disease which was in line with the findings of Pathania[8], Sharma[9] and Da silva *et al.*[3].

Table 2: Response of cauliflower genotypes to the diseases

Name of genotypes	Stalk rot incidence (%)	Black rot severity (%)
UHF-C-2	8.36 (3.04)	23.10 (4.88)
Palam Uphar	11.32 (3.48)	14.03 (3.85)
King King	5.78 (2.58)	22.61 (4.85)
Pusa Himjyoti	5.36 (2.50)	17.17 (4.24)
EC-683466	11.21 (3.48)	14.73 (3.95)
EC-683461	7.95 (2.97)	22.59 (4.83)
EC-162587	11.65 (3.54)	13.96 (3.85)
Hermia	8.43 (3.05)	13.61 (3.81)
Kt-18	15.23 (4.02)	26.34 (5.22)
Kt-25	6.95 (2.81)	24.83 (5.06)
Kt-19	8.07 (2.99)	16.48 (4.17)
Kt-20	11.10 (3.46)	27.88 (4.17)
Kt-22	9.91 (3.28)	22.58 (4.85)
Mukutamani	7.40 (2.89)	14.28 (3.90)
Sel-I	12.29 (3.63)	20.40 (4.62)
Sel-II	7.42 (2.89)	12.34 (3.65)
DC-76	3.95 (2.21)	17.58 (4.29)
Pant Shubhra	6.80 (2.77)	16.14 (4.11)
Snowball-16	10.72 (3.41)	20.02 (4.57)
PSBK-I (Check)	5.52 (2.55)	11.03 (3.46)
Mean	**8.77**	**18.58**
SE (d) ±	**0.28**	**0.32**
C.V.	**11.13**	**9.15**
CD at 5%	**0.56**	**0.66**

Figures in the parentheses denote transformed value

RICEYNESS

Majority of the genotypes under study were found to produce non ricey curds (Table 3). Among the twenty genotypes under study fourteen genotypes namely UHF-C-2, Palam Uphar, King King, Pusa Himjyoti, EC-683466, EC-162587, Hermia, Kt-25, Kt-19, Sel-II, Pant Shubhra, Snowball-16, PSBK-I, Kt-25 produced non ricey curds whereas rest six germplasms namely EC-683461, Kt-20, Kt-22, Mukutamani, Sel-I, DC-76 produced ricey curds.

Table 3: Classification of germplasms according to occurrence of riceyness

Sr.No	Riceyness	Number of genotypes	Name of the genotypes
1.	Non ricey curds	14	UHF-C-2, Palam Uphar, King King, Pusa Himjyoti, EC-683466, EC-162587, Hermia, Kt-25, Kt-19, Sel-II, Pant Shubhra, Snowball-16, PSBK-I, Kt-25
2.	Ricey curds	6	EC-683461, Kt-20, Kt-22, Mukutamani, Sel-I, DC-76

CONCLUSION

Considering the severity pattern and other field performances, the genotypes like DC-76, Pant Shubhra, Pusa Himjyoti, Hermia can be used as a source of resistance to stalk rot whereas apart from commercial check variety PSBK-I, Hermia, EC-162587, EC-683466 and Pant Shubhra can act as a source of black rot resistance. Mostly uniform and non ricey curds are produced by the genotypes namely Palam

Uphar, Hermia, EC-162587, Pant Shubhra and EC-683466. Lastly, it can be concluded that genotypes like Hermia and Pant Shubhra had lesser severity to both the diseases and produced mostly non ricey, uniform type curds. These two germplasm were also superior regarding all other field performances therefore, these genotypes can be used in combined breeding programme.

REFERENCES

1. Anonymous. Package of Practices for Vegetable Crops. Directorate of Extention Education, Dr. YS Parmar University of Horticulture and Forestry, Nauni, Solan. p.124 (2013).
2. Anonymous. Indian Horticulture Database. National Horticulture Board. *Gurgaon, Haryana*. pp-142-144 (2017).
3. Da Silva, L.R., Da Silva, R.C.D., Cardoso, A.F., Pela, G.M. and Carvalho, D.D.C., Reaction of cauliflower genotypes to black rot of crucifers, *Plant Pathol. J.* **31(2):** 181-185 (2015).
4. Dohroo, N.P., Germplasm reaction of cauliflower to stalk rot (*Sclerotinia sclerotiorum*), *Indian J. of Plant Pathol*. **6(2):** 144 (1988).
5. Gomez, K.A. and Gomez, A.A., Statistical Procedures for Agricultural Research, John Wiley and Sons Inc., New York, 1983, pp. 357-427.
6. Kanwar, M.S. and Korla, B.N., Genetic analysis in late cauliflower (*Brassica oleracea* var. *botrytis* L.), *Indian J. Genet*. **64(3):** 225-227 (2004).
7. Nieuwhof, M., Cole Crops, Leonard Hill, London, 1969, pp. 57-58.
8. Pathania, A., Evaluation of cauliflower genotypes for horticultural traits and resistance to some diseases and insect pests, M.Sc. Thesis, Department of Vegetable Science, Dr. Y.S.Parmar University of Horticulture and forestry, Solan, p. 66 (2003).
9. Sharma, K., Genetic variability studies of some genotypes of cauliflower *(Brassica oleracea var. botrytis L.)*, M.Sc thesis, Department of Vegetable Science, Dr Y S Parmar University of Horticulture and Forestry, Solan, p. 62 (2006).
10. Singh, H. and Kalada, T.S., Screening of cauliflower germplasm against Sclerotinia rot, *Indian J. Genet*. **55(1):** 98-102 (1995).
11. Swarup, V., Vegetable science and technology in India, Kalyani Publishers, New Delhi, 2006, p.359.
12. Williams, P.H., Staub, T. and Sutton, J.C., Inheritance of resistance in cabbage to black rot, *Phytopathology*. **62:** 247-252 (1972).