



Research Note :

RESPONSE OF GERBERA VARIETIES AGAINST POWDERY MILDEW DISEASE UNDER POLYHOUSE CONDITION

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Gerbera (*Gerbera jamesonii* Bolus ex. Hooker F.), belongs to the family Asteraceae, is a popular flower throughout the world. Many people enjoy growing this flower in gardens or large containers (Tjia *et al.*, 12). Its demand as cut flower and also as an ornamental potted plant gaining importance in the world market and has a very good export potential because of its graceful appearance, hardiness and ability to withstand during transportation and long shelf life (Latha and Suresh, 8). The tremendous variability in gerbera with reference to flower colour, shape and size makes it more useful for cut flowers, bouquet, decoration in marriage and landscaping in gardening (Aswath and Survay, 2). Apart from domestic consumption it has got export potential also. Claims have been made that from 30-70 % of the potential lasting quality of cut flowers is determined at harvest (Halevy and Mayak, 5). In India, gerbera is mainly grown in North Eastern States, Karnataka and Maharashtra (Aswath and Rao, 1). Gerbera is susceptible to a variety of pests and diseases. Powdery mildew is one of the most destructive fungal diseases of gerbera causing significant economic losses under poly house conditions. It is caused by two fungal species viz. *Erysiphe cichoracearum* DC and *Sphaerotheca fusca* (Fr.) (Beaura *et al.*, 3). They are the obligate parasites and can affect all parts of the plants. Powdery mildew is easy to identify since to noticeable white spots or powder like appearance or white patches appear on the upper and lower surfaces of the leaves or flowers. These spots are enlarge to form a white, powder like mat, which can spread to stems and flowers also (Moyer and Peres,

9). Severely infected leaves turn pale yellow or brown and the plants eventually die. Some environmental conditions are most congenial for powdery mildew development includes high relative humidity (80-95 %), moderate temperature (20-28 °C) and low light intensities or shade. Unfortunately poly house usually provide all these condition and the varieties will react specifically. Therefore information on the varieties showing resistant reaction to powdery mildew is meagre. Therefore, in the present study, nine gerbera varieties were screened for their reaction against powdery mildew disease under poly house condition.

Screening trial was conducted at Instructional farm, Department of Floriculture, College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh during April 2011 to March 2012. Nine varieties of tissue culture derived gerbera viz. Figaro, Galileo, Manizales, Marinila, Palmira, Pia, Rionegro, Tecala and Teresa were planted in the raised beds with a spacing of 30 x 30 cm under polyhouse condition. The plants were provided with all the inputs as per package and practices for gerbera cultivation. This experiment was laid out in complementary randomized design and replicated thrice with 20 plants for each replication. Powdery mildew was developed from the natural inoculums. Observations on symptoms of powdery mildew were recorded at 40 days interval upto 5 months (Approximate 160 days) of planting and 10 plants per replication were selected randomly for disease assessment.

Disease severity was recorded on the upper

Table 1: Reaction of gerbera varieties against powdery mildew during April 2011 to March 2012.

Varieties	Per cent disease index*				Disease reaction	Number of flowers m ⁻² / year	Number of sucker / plant / year
	40 DAP	80 DAP	120 DAP	160 DAP			
Figaro	0.0	3.93	6.53	9.73	R	143.00	3.80
Galileo	16.67	24.90	28.57	34.73	S	189.00	5.80
Manizales	12.50	16.90	31.33	46.93	S	137.20	3.20
Marinila	0.0	2.93	7.23	10.27	R	106.60	4.00
Palmira	0.0	1.57	6.50	9.27	R	190.00	5.40
Pia	23.77	33.27	55.00	65.30	HS	102.00	4.20
Rionegro	21.33	29.30	36.70	49.67	S	180.00	5.30
Tecala	19.33	31.00	44.93	54.27	HS	178.00	5.00
Teresa	10.33	15.67	20.77	24.57	MR	125.00	4.00

*Mean of three replications

DAP = Days after Planting

leaf surfaces at the earlier growth stages and at the later stages on the lower leaves also and rated on a 0 to 6 scale (Standard disease severity scale) as 0 = No powdery growth, 1 = 1-20% of the leaf area with powdery growth, 2 = 21-40% of the leaf area with powdery growth, 3 = 41-60% of the leaf area with powdery growth, 4 = 61-80% of the leaf area with powdery growth, 5 = 81-99% of the leaf area with powdery growth and 6 = 100 % of the leaf area with powdery growth (Moyer and Peres, 9). Using the standard disease score chart, the per cent disease index (PDI) was worked out according to the FAO (4) formula and the data were analysed statistically.

Per cent disease index (PDI) =

$$\frac{\text{Sum of total numerical rating}}{\text{Total number of observations} \times \text{Maximum grade}} \times 100$$

From the PDI calculated, the reaction of the varieties were categorized as 0% PDI = Immune to powdery mildew, 5% PDI = Highly Resistant (HR), 5-10% = Resistant (R), 11-25% = Moderately Resistant (MR), 25-50% = Susceptible (S) and 51-100% = Highly Susceptible (HS).

The results obtained (Table 1) clearly showed that all the varieties were differing to each other for disease incidence. Nine varieties of gerbera were screened against powdery mildew under polyhouse condition. Powdery mildew symptoms were first observed on the leaves of the varieties viz. Pia,

Rionegro and Tecala on 30 days after planting. On Manizales, Teresa and Galileo powdery mildew incidence started only after 38 days of planting. On the other varieties Figaro, Marinila and Palmira powdery mildew incidence started only after 68 days of planting. Palmira variety showed resistance to powdery mildew with per cent disease index of 9.27% at the end of 160 days after planting followed by Figaro and Marinila with PDI of 9.73% and 10.23%, respectively. Variety Teresa showed moderately resistant reaction 24.57% against powdery mildew infection. Varieties Pia and Tecala were highly susceptible to powdery mildew throughout the experiment which showed per cent disease index of 65.30% and 54.27%, respectively. Other varieties like Galileo (34.73%), Manizales (46.93%) and Rionegro (49.67%) showed susceptible reaction to powdery mildew infection. These findings are closely supported by (Jamadar *et al.*, 6) for disease resistance in grapevine genotypes to powdery mildew infection and Sharma and Sharma (11) and in lady's finger to yellow vein mosaic virus (YVMV). To overcome economic losses due to disease and avoid repeated application of fungicide, development of resistant variety is the best method for disease management. Evaluation procedure in the green house could be used as a rapid assay to screen plants for resistance (Scholten *et al.*, 10). Screening could be important in the

development and evaluation of new resistant cultivar if incorporated into breeding programmes (Kozik, 7). Through the study, powdery mildew resistant screening methodology for gerbera under polyhouse condition has been established and few resistant varieties of gerbera against powdery mildew were indentified. Those varieties may be utilized for future breeding programme to evolve powdery mildew disease resistant gerbera varieties.

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Faba Bean (*Vicia faba* L.)
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Dr. B. P. Bhatt, Director, ICAR NEER, Patna, started his career as Lecturer at H.N.B. Garhwal University, Srinagar, Garhwal (Uttarakhand). He served as Senior Principal Scientist and Joint Director at ICAR Research Complex for NEH Region, Bikaner, Rajasthan. Dr. Bhatt has wide experience in research, teaching, transfer of technology and administration. He has 24 years of teaching and research experience. Dr. Bhatt has accomplished 15 research projects of international, national and regional importance. He has also supervised six Research Scholars for their Ph.D. degree. Dr. Bhatt is a fellow of National Academy of Agricultural Sciences since 2009. He is a recipient of award for the outstanding contribution in "Forest Silviculture" research, for the year 1998-99 from ICARE, Dehradun and "Vaidubhai Ali Ahmed Award for the Bestman 2004-2005" from ICAR for the outstanding contribution on Intensive Integrated Farming System for Livelihood Security in NEH Region. Dr. Bhatt has been also awarded "Emeritus Scientist Award 2012" for outstanding research contributions for advancement of scientific knowledge in the field of agriculture, conferred in International Conference on Life Science Research for Rural and Agricultural Development. He is also recipient of "Bharat Jyoti Award 2012" for research contribution in Food and Nutritional Security of resource poor farmers, conferred by India International Friendship Society, New Delhi. Dr. Bhatt has more than 165 publications in his credit. He has represented the country in Multi-Country Study Mission on Rehabilitation of Forests Organized by Saurashtra, held at Rajkot, India during 8th to 13th October 2005.

Dr. A. K. Singh, Senior Scientist (Agronomy) ICAR Research Complex for Eastern Region, Patna, started his career as Scientist by joining Agricultural Research Services (ARS) in year 2000 at NBGR Sinagar (Jamnā & Kachh), Gujarat. Dr. Singh has 12 years of professional experience in research in the field of agriculture (Resources and Input Management) and plant genetic resources (IPGR Management). He has completed 18 research projects. He has developed two faba bean varieties. Dr. Singh has more than 150 publications to his credit. His contribution for strengthening agricultural science and capacity building through various activities has been recognized by the same professional societies. He is a recipient of "Young Scientist Award - 2013" for the outstanding advancement of scientific knowledge in field of agriculture by International Consortium for Contemporary Biologist and MSST, Ranchi (Jharkhand). Dr. Singh is also recipient of "Kumar Sekara Bahadur SIDA Award 2010" and "Scientist of the Year Award 2009" for understanding and recognition in the field of agriculture by Society for Rural Development (SRD) in Agriculture, Meerut (UP). Society for upliftment of rural economy (SURI) Varanasi (UP) has awarded Dr. Singh with "Rural Scientist of Millennium - 2008-2009" for his technical contribution for improving certified dry land agriculture.

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