

Characterization of Fieldpea Varieties by Chemical Sensitivity Test

MAMTA SAHU, RAJANI TOMAR AND D. KHARE

Seed Technology Research Unit, Plant Breeding and Genetics, JNKVV, Jabalpur 482 004
dhirendrakhare@gmail.com

Characterization of 25 varieties of field pea during 2004-05 was conducted in Seed Technology Research Unit of JNKVV, Jabalpur. The varieties of field pea may be verified based on differential response for chemicals viz., GA₃ (100 ppm) on root and shoot elongation; 2,4-D (0.3 ppm) in degree of germination inhibition as high and medium and metribuzin (0.25 kg/ha) sensitivity as susceptible and resistant.

Field pea (*Pisum sativum* var. *arvense* 2n = 14, centre of origin Mediterranean region), the third most important pulse crop at global level occupies an area of 0.87 million ha in India (UP, M.P., Bihar and Maharashtra) with an annual production of 0.70 million tonnes [1]. The present investigation was carried out to study the differential response of chemicals at seedling level.

A variety is traditionally described by a set of morphological characteristics, which are used to establish its Distinctness, Uniformity and Stability. It involves comparison of varieties by number of phenotypic characters. It is time consuming and expensive, requiring large area and skilled personnel [2]. Many of the traits are multigenic or quantitative and expression is altered by environmental factors. These are compelling reasons to find more rapid and cost effective procedures to test varieties and can distinguish it on the basis of biochemical properties of seeds or seedlings.

The investigation was carried out on randomly selected healthy seeds (source IIPR, Kanpur) used for sowing and harvest material (2004-2005) in the

laboratory and polyhouse of Seed Technology Research Unit, JNKVV, Jabalpur.

GA₃ growth response test

Randomly selected 20 seeds of each variety were incubated at 20 ± 2°C for seven days in paper towel moistened with freshly prepared 100ppm GA₃ solution. The control was moistened with water. The seedling length was recorded on 8th day of final count. The varieties with 20-30 per cent increase in growth over control were grouped as high responsive, whereas others were grouped as low responsive varieties [3].

2,4-D soak test

Randomly selected 20 seeds of each variety were soaked in 0.0, 0.5, 0.4 and 0.3 ppm of 2, 4-D solution separately. These seeds were germinated on paper towel (20 ± 2°C). After seven days root length was measured. Inhibition due to treatment in the root length was compared with control [4].

Herbicide sensitivity test

Randomly selected 25 healthy seeds of each variety were planted in pots at controlled temperature of 20±°C. After 10 days herbicide *metribuzin* was sprayed at the rate of 0.0 (control), 0.25, 0.50 and 0.75 kg/ha by knap sack sprayer. The differential response of the varieties to herbicide was observed 10 days after spray [5].

The GA₃ response was measured in terms of increase in root and shoot length. Except variety DDR-27, all the remaining varieties were found to

Table 1. Categorization of field pea varieties based on differential response to herbicides in year 2004-05

Expression	
Response to GA₃ for shoot elongation	
Responsive	Non-responsive
Ambica, DDR-23, DDR-44, DMR-7, HFP-4, HFP-8909, HUDP-15, HUP-2, Jayanti, JM-6, JP-885, KPMR-144, KPMR-400, KPMR-522, LFP-48, Pant P-5, PG-3, Rachna, Shubhra, Shikha, Swati, VL-1, VL-3	DDR-27
Response to GA₃ for root elongation	
Responsive	Non-responsive
DDR-27, DDR-44, HFP-4, HFP-8909, HPDP-15, HUP-2, Jayanti, JM-6, JP-885, KPMR-144, KPMR-400, KPMR-522, Pant P-5, PG-3, Rachna, Shubhra, Swati, VL-1, VL-3	Ambica, B-22, DDR-23, DMR-7, LFP-48, Shikha
2,4-D for root length inhibition	
High responsive	Medium responsive
Ambica, B-22, DDR-23, DDR-27, DMR-7, JM-6, KPMR-144, KPMR-400, LFP-48, Pant P-5, VL-3	DDR-44, HFP-4, HFP-8909, HUDP-15, HUP-2, Jayanti, JP-885, KPMR-522, PG-3, Rachna, Shubhra, Shikha, Swati, VL-1
Response to metribuzin	
Susceptible	Tolerant
B-22, DDR-23, HFP-4, HFP-8909, HUP-2, Jayanti, JP-885, KPMR-144, KPMR-400, KPMR-522, VL-1, VL-3	Ambica, DDR-27, DDR-44, DMR-7, HUDP-15, JM-6, LFP-48, Pant P-5, PG-3, Rachna, Shubhra, Shikha, Swati

be responsive for shoot length (Table 1). Varieties Ambica, B-22, DDR-23, DMR-7, LFP-48 and Shikha were non responsive for root length whereas remaining varieties were responsive. The observation supports the findings of Kof. *et al.* [3].

Inhibition in root length of the treated seedlings with 2,4-D solutions was observed to test the varieties. The germination was completely inhibited @ 0.5 and 0.4ppm concentration of 2,4-D. Varieties Ambica, B-22, DDR-23, DDR-27, DMR-7, JM-6, KPMR-144, KPMR-400, LFP-48, Pant P-5 and VL-3 were highly responsive to 2,4-D @ 0.3 ppm as it showed reduction in root length to a greater extent whereas, remaining were less responsive (Table 1).

Differential response to metribuzin herbicide

@ 0.25 kg/ha was observed as susceptible and resistant. All the varieties were susceptible @ 0.5 kg/ha and 0.75kg/ha dose of metribuzin. The varieties B-22, DDR-23, HFP-4, HFP-8909, HUP-2, Jayanti, JP-885, KPMR-144, KPMR-400, KPMR-522, VL-1 and VL-3 were susceptible and the remaining were tolerant (Table 1), confirms the observations by Khatib *et al.*, [5].

For the establishment of the uniformity for the expression of each variety, tolerance limit is kept 1 per cent. Varieties with more than 1 per cent off-type expression are not considered as uniform. Response against all the chemicals was uniform. The present investigation revealed that field pea varieties may be verified on differential response for chemicals viz., GA₃ (100ppm), 2,4-D (0.3ppm) and metribuzin (0.25kg/ha) sensitivity.

REFERENCES

1. ANONYMOUS (2002). Government of Madhya Pradesh Compendium of Agriculture Statistics, Publ. Govt. of M. P. p 68.
2. COOKE, R.J. (1995). Varietal identification of crop plants. In: J. H. Skerritt and Appels (eds) *New Diagnostics in Crop Sciences*, pp 33-63. CAB International Wallingford.
3. KOF. E., E.S. CHUVASHIEVA & V.L. KANDYOV (1998). Response of pea genotypes in contrasting leaf morphology and stem height to gibberellic acid and chlorocholine chloride. *Russian J. Plant Physiol.*, **45**(3): 379-387.
4. JACOBSEN, H.J. (1978). Effect of 2, 4-D on early germination in pea. *Legume Res.*, **1**(2): 101-107.
5. KHATIB, A., L.K. LIBBEY, C. KADIR & S. BOYDSTON (1997). Differential varietal response of green pea to metribuzin. *Weed Technol.*, **11** (4): 775-781.