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Short Note

Screening of Promising Sunflower Germplasm against Key Insect Pests

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Field experiments were conducted in the Department of Oilseeds, Tamil Nadu Agricultural University, Coimbatore during *Kharif*, 2007 to screen the promising germplasm entries of sunflower for confirmation of reaction to key pests *viz*. leafhoppers, thrips, whiteflies, defoliators and head borer. Results revealed that all the five germplasm entries *viz*., GMU 407, GMU 415, GMU 424, GMU 473 and GMU 493 were promising to the key pests of sunflower. GMU 473 recorded the maximum of 5.0 thrips and 3.0 *S. litura* larvae per plant with the defoliation of 25 per cent as against 7 and 0 per cent defoliation in the checks, Morden and TCSH 1, respectively. GMU 424 recorded the maximum of 0.4 leafhoppers per plant as against 28 and 19 hoppers per plant in Morden and TCSH 1, respectively. Screening under glasshouse condition revealed that GMU 473 recorded the maximum grade of 0.5 for hopper burn injury as against 3.5 and 2.2 in the checks Morden and TCSH 1 respectively. GMU 415 and GMU 493 recorded the lowest grade of 0.1.

Key words: Sunflower, screening, leafhoppers, thrips, defoliators and head borer.

Sunflower (*Helianthus annuus* L.) one of the most important oilseed crops in India is cultivated in an area of 2.2 million hectares with an average production and productivity of 1.23 million tonnes and 567 kg ha^{-1}, respectively during the year 2006-2007. In Tamil Nadu, the area under sunflower is increasing tremendously during recent years, with an area, production and productivity of 0.26 lakh hectares, 0.48 lakh tonnes and 1828 kg ha^{-1}, respectively during 2006 - 2007 (Anonymous, 2008).

As many as 251 insect and acarine species are known to attack sunflower worldwide (Rajamohan, 1976). In India, more than fifty insect species have been found feeding on sunflower of which leafhopper (*Amrasca biguttula biguttula Ishida*), whitefly (*Bemesia tabaci* (Gennadius)), thrips (*Scirtothrips dorsalis* Hood), mealy bugs (*Phenacoccus solenopsis* Tinsley), defoliators like tobacco caterpillar (*Spodoptera litura* (Fab.)), green semilooper (*Thysanoplusia orichalcea* Fab.) and capitulum borer (*Helicoverpa armigera* Hubner) are of economic importance. Non-insect pests such as rabbits, parakeets, doves, house sparrows, crows, rats, *etc*. have been reported to cause severe damage on sunflower. The yield loss ranges from 35.7 to 51.3 per cent due to insect damage. The productivity has been limited mainly due to the heavy damage inflicted by the capitulam borer resulting in a yield loss upto 50 %. Among the sucking pests, the leafhopper, thrips, mealy bugs and whiteflies caused varying levels of crop loss throughout India (Basappa, 2008).

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Materials and Methods

Field experiments were conducted in the Department of Oilseeds, Tamil Nadu Agricultural University, Coimbatore during *Kharif*, 2007 to screen the promising germplasm entries of sunflower for confirmation of reaction of those entries to key pests *viz*. leafhoppers, thrips, whiteflies, defoliators and head borer. Among the 100 sunflower germplasms received from the Directorate of Oilseeds Research, Hyderabad, after field screening the entries GMU 407, GMU 415, GMU 424, GMU 473 and GMU 493 were identified as the promising cultures and used as test entries in the advanced screening programme. The sunflower variety Morden and the hybrid TCSH-1 were used as checks to compare the resistance of the promising test entries. Each entry was sown in a single row of 4.2 m length and the checks Morden and TCSH 1 were sown on both the sides of test entry in sandwich method with the spacing of 60 x 30 cm. The experiment was conducted in a randomized block design with seven treatments (five test entries and two checks *viz.* Morden and TCSH -1) and replicated thrice.

Observations were recorded on the incidence of leafhoppers, hopper burn injury, thrips, whiteflies, defoliators namely, *Spodoptera litura, Thysanoplusia orichalcea,* head borer, per cent defoliation and per cent seed damage. For screening under glass house conditions, leafhoppers were released @ 10 per pot and covered with mylar film cage. Hopper burn injury was graded on 0-5 scale. Data were subjected to statistical analysis (Panse and Sukhatme, 1978).

Results and Discussion

The results of the open field screening and screening under glass house conditions revealed that the maximum germination of 98 per cent was noticed in all the entries and in the checks. All the five entries were found to be promising to the key pests of sunflower. Among the five entries, GMU 473 recorded the maximum of five thrips and three S. litura larvae per plant with the defoliation of 25 per cent as against 7 and 0 per cent defoliation in the checks, Morden and TCSH 1, respectively. GMU 424 recorded the maximum of 0.4 leafhoppers per plant as against 28 and 19 hoppers per plant in Morden and TCSH 1, respectively. The entries GMU 407, 415 and 493 were found to be promising against leaf hoppers (free from incidence and injury), defoliators and head borer. Except GMU 473, all other four entries were free from the damage caused by defoliators and head borer (Table 1).

Screening under glasshouse condition revealed that GMU 473 recorded the low hopper burn injury grade of 0.5 as against 3.5 and 2.2 in the checks

Table 1. Field screening for confirmation of reaction of promising entries to key pests of sunflower under Uniform Pest Nursery (Kharif' 08)

Entry	Leaf hopper (No./plant)	Hopper burn (Grade)	Thrips (No./ plant)	Whiteflies (No./ plant)	Defoliators (No./plant)		Defoliation (%)	Head borer (No./plant)	Seed damage (%)	Hopper burn (Grade)*
					S. litura	*T. orichalcea*				
GMU 407	0	0	4	1	0	0	0	0	0	0.2
GMU 415	0	0	1	2	0	0	0	0	0	0.1
GMU 424	0.4	0.1	3	1	0	0	0	0	0	0.4
GMU 473	0.2	0.1	5	1	3	0	25	0	0	0.5
GMU 493	0	0	3	2	0	0	0	0	0	0.1
Morden	28	3	17	12	1	0	7	1	2	3.5
TCSH 1	19	2	11	9	0	0	0	0	0	2.2

* Under confirmed screening technique in glass house. **Mean of observations from 10 randomly selected plants.

Morden and TCSH 1 respectively. GMU 415 and GMU 493 recorded the lowest hopper burn injury grade of 0.1. Results of biochemical analysis of plant samples revealed that the accumulation of total phenols was maximum in GMU 493 (246 mg/100 g), followed by GMU 415 (174 mg/100 g) and GMU 407 (162 mg/100 g). Among the test entries, GMU 473 registered the minimum total phenols of 128 mg/100 g. While, the total phenol content was only 94 mg/100 g in the local susceptible check variety Morden. Increased level of total phenols in GMU 493, 415 and 407 might be the reason for their resistance to key pests.

According to Schoonhoven *et al*. (1998) the fitness of insects can be influenced by the plants they feed on. Some plants contain compounds, such as flavonoids, that insects can sequester into their body cuticle for protection against pathogens and predators or into their wings to attract mates. Phenolic compounds reportedly play a role in pest resistance and are known to affect the activity of various enzymes. (Barbehenn, 2002).

Condensed tannins are phenolic compounds that act as effective feeding deterrents to many insects and spider mites. Numerous studies have reported a positive correlation between total phenolics of leaves of many species and resistance to a number of insects and mites (Luczynski *et al*., 1990; Guerra *et al.,*1990). Plant polyphenol oxidases (PPOs), which catalyze the O_2-dependent oxidation of phenolics to quinines, have been proposed as a component of elaborate plant defense mechanisms. PPO activity could provide resistance simultaneously to both disease and insect pests and therefore might be used as a component of effective integrated pest management.

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