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RESEARCH NOTE

Evaluation of weed management practices on growth and fruit yield of pomegranate (*Punica granatum* L.)

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ABSTRACT

A field experiment was carried with an objective to evaluate different weed management treatments and identify weed management treatments that effectively manages weeds and increases the growth and fruit yield of pomegranate (*Punica granatum* L.**)**. It was conducted at Central Block, Horticultural College and Research Institute, Periyakulam, Tamil Nadu during *Kharif* and *rabi* seasons of the years 2017-2018 and 2018-2019. Tested pre- and post-emergence herbicides in pomegranate were applied before the onset of South West monsoon and North East monsoon in *Kharif* and *Rabi* seasons respectively. Pre-emergence application (PE) of indaziflam 500 SC (indaziflam) 62.5 g/ha recorded significantly lower weeds density and biomass at 90 days after herbicide application (DAA) during both the seasons. Higher weed density was recorded in untreated control at all stages of crop growth during both the seasons. Indaziflam 62.5 g/ha recorded significantly lower weed biomass at 90 DAA. Next in effectiveness to manage weeds was indaziflam 50 g /ha during both the seasons and it resulted in higher weed control efficiency at all stages. There was no phytotoxicity due to indaziflam on pomegranate. Significantly higher pomegranate fruit yield was recorded with hand weeding during both *Kharif* and *Rabi* seasons and it was closely followed by indaziflam 62.5 g/ha. Indaziflam 62.5 g/ha recorded significantly higher fruit yield than the standard check of oxyfluorfen 940 g/ha during both the seasons.

Keywords: Fruit yield, Indaziflam, Oxyfluorfen, Pomegranate, Weed management,

One of the first known edible fruits, the pomegranate (*Punica granatum* L.) can grow in a variety of agro- climates, from tropical to temperate, across the globe. India accounts for half of global pomegranate production. Maharashtra leads the Indian states in terms of pomegranate production and area followed by Karnataka, Andhra Pradesh, and Gujarat. Due to its wonderful combination, sweet-acidic taste, and great dessert quality, it is a popular commercial fruit preferred by consumers worldwide. The fruit's edible portion is rich in essential minerals, polysaccharides, sugars, vitamins, acids, and polyphenols. Fruit juice's flavour is determined by the concentration of organic acids (citric, malic, oxalic, and succinic). The fruit is also well-liked because of its nutritional value and therapeutic qualities, which can be used to treat a variety of human disorders, including coronary heart disease, cancer (skin, breast, prostate, and colon), inflammation, hyperlipidaemia, diabetes, cardiac disorders, hypoxia, ischemia, aging, and brain disorders. Due to its broad adaptability, greater yield, drought resistance, and salinity tolerance, this crop is becoming more and more popular in arid and semiarid regions of India (Kaulgud 2002).

Weeds caused reduction in yield was noticed in agricultural and horticultural crops due to competition for the resources and also weeds served as alternate host for insects, diseases, nematodes and increased the pest problem. As pomegranate trees have fewer roots per unit of soil than weeds, fruit trees are considered to be weaker competitors. In order to prevent unregulated weed growth from competing with fruit trees for moisture and nutrients and interfering with orchard operations, lowering yields and raising production costs, timely weed control is essential. Herbicide application maintained bare soil between 0.6 and 2.0 m along the tree row has be found simple, economical, and beneficial for fruit production and tree growth (Harrington *et al*. 2005, Lisek 2014). Adequate weed control techniques are crucial to reduce weed competition and increase fruit production. Thus, an experiment was conducted with an objective to evaluate different weed management treatments and identify weed management treatments that effectively manages weeds and increases the growth and yield of pomegranate (variety Bhagwa).

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Experiment was conducted during *Kharif* and *Rabi* seasons of the 2017-2018 and 2018-2019 at Central Block, Horticultural College and Research Institute, Periyakulam, Tamil Nadu located at 10.13^0 N, 77.59^0 E and at an altitude of 289 m above mean sea level with average rainfall 791.1 mm. The soil was sandy loam having pH 7.1, organic carbon (0.28%), medium in available nitrogen (295 kg/ha), low in available P (10.6 kg/ha) and medium in available potash (228 kg/ha). A Randomized Block Design with three replications was used. The experiment consisted of ten treatments, *viz.* untreated control; indaziflam 500 SC (indaziflam) 37.5 g/ha, indaziflam 50 g/ha, indaziflam 62.5 g/ha, oxyfluorfen 23.5% EC (oxyfluorfen) 940 g/ha, weed free check with need based hand weedings, indaziflam 62.5 g/ha + glyphosate 41% SL (indaziflam + glyphosate) 1230 g/ha, indaziflam 62.5 g/ha + glufosinate-ammonium 13.5 % SL (indaziflam + glufosinate-ammonium) 500 g/ha, glyphosate 1230 g/ha and glufosinate-ammonium 500 g/ha. Indaziflam is an aliphatic group of herbicides.

The study was initiated in an already established pomegranate fields after pruning. Spacing of followed for pomegranate was 2.5 m x 3.0 m. Fertilizer dose of 0.60: 0.50: 1.2 kg/tree NPK was followed. Plant protection chemicals were applied as and when required. Other regular package of practices was followed in pomegranate as per TNAU Crop Production Guide.

Prior to the start of the monsoon, early-emerging weeds were manually removed. Pre-emergence application of indaziflam at different concentration was sprayed at the onset of South - West monsoon and North East monsoon periods. To keep the area weed-free, periodic hand weeding was followed. When the weeds were in the fourth to sixth leaf stages, post-emergence application of indaziflam was sprayed, as per the treatment, using a knapsack sprayer in a water volume of 500 L/ha. Weed density and weed biomass was recorded at 90 days after herbicide application (DAA) using standard procedures. Weed control efficiency was computed at 90 DAA. Data pertaining to weed density and biomass was subjected to square root transformation before statistical analysis. Statistical analysis was done as per the method suggested by Gomez and Gomez 1984).

The weed flora in the experimental field during the study period consisted of grasses and broad-leaved weeds. Sedges were not noticed in the experimental field. *Cynodon dactylon* and *Dactyloctenium aegyptium* among grasses and *Corchorus trilocularis, Acalypha indica, Boerhavia diffusa, Cleome viscosa, Eclipta alba, Euphorbia hirta, Leucas aspera, Phyllanthus niruri, Sida acuta* and *Trianthema portulacastrum* among major broad-leaved weeds were observed. *Cleome viscosa* and *Cynodon dactylon* were the dominant weeds.

Table 1. Effect of indaziflam on pomegranate fruit yield, weed density, weed biomass, weed control efficiency at 90 days after herbicide application

Treatment	Weed density (no./m^2)						Weed biomass (g/m^2)		Weed control efficiency (%)		Fruit yield (t/ha)	
	Kharif			*Rabi*								
	Grass	BLW	Total	Grass	BLW	Total	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*
Untreated control	6.45 (41.5)	12.27 (150.5)	13.86 (192.1)	6.60 (43.6)	12.77 (163.1)	14.37 (206.70)	12.11 (146.6)	13.11 (171.8)	-	-	4.32	4.89
Indaziflam 37.5 g/ha PE	3.58 (12.8)	6.95 (48.3)	7.82 (61.1)	3.67 (13.5)	7.12 (50.7)	8.01 (64.2)	6.98 (48.7)	8.75 (76.6)	61.81	63.41	9.23	9.69
Indaziflam 50 g/ha PE	3.20 (10.2)	5.37 (28.9)	6.25 (39.1)	3.28 (10.7)	5.50 (30.3)	6.40 (41.0)	5.69 (32.4)	6.06 (36.7)	77.92	78.62	10.87	11.41
Indaziflam 62.5 g/ha PE	2.96 (8.8)	5.20 (27.1)	5.99 (35.8)	3.04 (9.2)	5.33 (28.4)	6.13 (37.6)	5.40 (29.1)	5.51 (30.4)	80.13	80.76	11.05	11.60
Oxyfluorfen 940 g/ha PE	3.51 (12.3)	6.84 (46.9)	7.69 (59.1)	3.59 (12.9)	7.01 (49.2)	7.88 (62.1)	7.69 (59.2)	8.44 (71.2)	59.62	60.89	9.68	10.16
Weed free check (hand weeding)	0.71 (0.5)	0.71 (0.5)	1.00 (1)	0.72 (0.5)	0.72 (0.5)	1.02 (1.1)	0.71 (0.5)	3.11 (9.7)	99.66	99.67	12.37	12.99
Indaziflam 62.5 g/ha + glyphosate 1230 g/ha PoE	3.57 (12.7)	6.52 (42.5)	7.43 (55.3)	3.66 (13.4)	6.68 (44.7)	7.62 (58.0)	7.76 (60.2)	7.99 (63.8)	58.95	60.24	10.18	10.69
Indaziflam 62.5 g/ha + glufosinate-ammonium 500 g/ha PoE	3.59 (12.9)	5.93 (35.2)	6.93 (48.1)	3.68 (13.6)	6.08 (36.9)	7.10 (50.5)	6.06 (36.7)	6.62 (43.9)	74.97	75.76	9.76	10.25
Glyphosate 1230 g/ha PoE	3.51 (12.3)	8.12 (65.9)	8.84 (78.2)	3.59 (12.9)	8.32 (69.2)	9.06 (82.1)	8.96 (80.2)	9.43 (89)	45.25	46.98	8.21	8.62
Glufosinate-ammonium 500 g/ha PoE	3.47 (12)	7.95 (63.1)	8.67 (75.2)	3.55 (12.6)	8.14 (66.3)	8.88 (78.9)	8.52 (72.6)	8.94 (79.9)	50.47	52.03	8.56	8.99
LSD (p=0.05)	0.087	0.115	0.183	0.089	0.141	0.171	0.148	2.031	-	-	0.321	0.533

Data in parentheses are original values which were subjected to square root transformation $\sqrt{x+0.5}$ before analysis; PE =pre-emergence application; PoE = post-emergence application

Effect on weeds

Significantly lower weed density was found in weed free check due to regular need-based hand weeding. Weeds were efficiently controlled by indaziflam PE applied alone or in combination with other post-emergence applied herbicides **(Table 1)**. Indaziflam 62.5 g/ha PE reduced the overall weed density considerably at all stages of observation followed by indaziflam 50 g /ha and indaziflam 62.5 g /ha + glufosinate-ammonium 500 g/ha during both the seasons of the study. **(Table 1).** These results are in conformity with the findings of Kavitha *et al*. (2021) in acid lime. Highest weed density was recorded in untreated control at all stages of crop growth during both the seasons.

Indaziflam 62.5 g/ha PE recorded significantly lower weed biomass at 90 DAA during both *Kharif* and *Rabi* seasons. It was superior to indaziflam 50 g/ ha. Weed biomass was more in untreated control, as expected, due to higher weed density. Weed control efficiency (WCE) was the highest in weed free check during both of the seasons. Indaziflam 62.5 g/ha recorded WCE of 80.13 and 80.76% at 90 DAA respectively during *Kharif* and *Rabi* seasons **(Table 1).** Lower weed density and biomass were associated with higher weed control efficiency (Patel *et al*. 2004).

Effect on pomegranate fruit yield

Weed free check produced a significantly higher fruit yield during both *Kharif* and *Rabi* season **(Table 1).** Indaziflam 62.5 g/ha PE resulted in significant increase in fruit yield. This treatment of 14.1% and 14.2% increase in fruit yield during *Kharif* and *Rabi* seasons, respectively as compared to the standard check of oxyfluorfen 940 g/ha. The unweeded control had the lowest yield. These results are in agreement with those of Patel *et al.* (2004).

Conclusion

Indaziflam 62.5 g/ha PE gave effective weed management and significantly higher pomegranate fruit yield than standard check oxyfluorfen 940 g/ha.

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