



ADOPTION CORRELATES OF POMEGRANATE GROWERS IN WESTERN MAHARASHTRA ABOUT PEST MANAGEMENT

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Abstract: Pomegranate (*Punicagranatum* L.) is one of the important fruits of tropical and subtropical regions of the country, which belongs to family puniceae. It is also cultivated in semi-arid tracts of the country but requires irrigation water for better quality of fruit production. Pomegranate is gaining a lot of attention world over because of its high economic and nutraceutical values. India is the largest pomegranate producer in the world (8.6 lakhs tones) sharing about 36 per cent of the world's production. Maharashtra state (cultivated area 82 thousand ha) is considered as pomegranate basket in India contributing almost 80 per cent of production (560 thousand tones). Plant protection measures are vital for successful fruit production in pomegranate. The major pests of pomegranate observed in India are fruit sucking moth, shot hole borer, pomegranate butterfly, bark eating caterpillar. The study revealed that the majority of the pomegranate growers had 36 to 50 years age, received up to degree and higher education, had higher socio-economic status, cosmopolitanism and small land holding, cultivating the pomegranate crop on 2.01 to 5.00 hectares of their land holding, had annual income between Rs. 4, 00,001/- to 7, 00,000/-, were having higher scientific orientation (60.44 %), economic motivation (58.22) and innovativeness (40.44 %), 44.89, 38.67 and majority of the pomegranate growers had not adopted practices like removal of infested trees (64.44 %), prophylactic measure, application of geru+ chemical paste (44.89 %), drenching with azadirachtin (55.56 %) with regards to control of shot hole borer/ pinhole borer. Further, majority of the respondents (99.11, 61.33 and 57.78 per cent) had not adopted practices like spraying of methyol oxydematon, spraying of spinosad and biopesticides spray of NSKE or verticilliumlecani, respectively for control of thrips in pomegranate.

Key words: Plant protection measure, pest, nematode, aphod, pin hole borer.

Material and Methods

The pomegranate is being grown on larger area in Nashik, Solapur, Sangali, Ahmednagar, Satara and Jalgaon districts of Maharashtra state. The present investigation was carried out in Sangli, Solapur and Nashik districts from Kolhapur, Pune and Nashik divisions due to the higher area under pomegranate cultivation. The three tahasils viz., Atpadi, Sangola and Satana were selected for the study based on the maximum area under pomegranate cultivation in the district. Further, five villages from each tahasil were selected purposively on the basis of maximum area under pomegranate cultivation. In all total fifteen villages were selected for the study. The specially structured personal

interview schedule was designed and the data were collected from 225 pomegranate growers and data were analyzed. The emphasis in the study was on adoption level of farmers with respect to the plant protection measures amongst the pomegranate growers. Hence, an exploratory design of social research was used for conducting the present study.

Results and Discussion

B) Personal traits of pomegranate growers in Western Maharashtra

The data regarding the personal traits of the respondent's viz., age, education, socio-economic status and cosmopolitanism of pomegranate growers are depicted as follows.

The data presented in Table 1 revealed that majority of the pomegranate growers were of 'middle' age. Fifty five per cent of the total respondents were 'middle' age followed by 32.89 per cent 'young' age respondents and 11.56 per cent 'old' respondents. It is inferred from the table that more young and middle aged farmers are engaged in the pomegranate cultivation.

The data presented in Table 1 shows that maximum number of respondents (36.00 %) were educated upto 'degree' and higher education level, followed by respondents educated upto the 'secondary' and 'higher secondary' level (21.78 and 20.00 % respectively). Respondents having 'primary' level of education were only 1.78 per cent; however, there were 20.00 per cent respondents educated upto 'primary' level of education. Further, majority of the pomegranate growers (51.55 %) belonged to 'high' to very higher socio-economic status, followed by the respondents (21.78 %) belonging to 'medium' socio-economic status. While, 18.22 per cent of them had 'low' socio-economic status.

It is observed from Table 1 that, majority of the pomegranate growers (46.67 %) had 'higher' level of cosmopolitanism, followed by 28.89 per cent and 24.44 per cent had 'medium' and 'low' level of cosmopolitanism respectively. The data thus indicated that large proportions of respondents were had higher cosmopolitanism. Besides, majority of the pomegranate growers (41.33 %) had annual income between Rs. 4, 00,001/- to 7, 00,000/-. However, an equal proportion of respondents had income upto Rs. 4, 00,000/- and Rs. 7, 00,001/- to 10, 00,000/- respectively. While, 17.78 per cent had income above Rs. 10, 00,000/-.

It was apparent from Table 1, that nearly two-fifth of the respondents (38.67 %) belonged to the category of 'small' land holding ranging from 2.01 to 4.00 ha. It was followed by (32.00 %) 'medium' land holding possessing land from 4.01 to 10.00 ha. and (19.11 %) respondents belongs to 'large' holding category i.e. above 10.00 ha. While, majority of pomegranate growers (52.00 %) belonged to the category of 'small' area under pomegranate

cultivation from 2.01 to 5.00 ha. followed by (25.33 %) 'marginal' category holding area up to 2.00 ha. and (14.22 %) respondents belongs to 'medium' category i.e. from 5.01 to 7.50 ha. The data thus indicated that a large proportion of the respondents were having '2.01 to 5.00 hectare' area under pomegranate.

From Table 1, it was apparent that most of the respondents (52.89 %) had experience up to 7 years in pomegranate cultivation. It was followed by (32.44 %) respondents who had experience from 8 to 12 years and only (14.67 %) of the respondents had experience above 13 years in pomegranate cultivation. Further, majority i.e 60.44 per cent of the respondents had 'high' economic motivation category. However, 26.22 and 13.33 per cent had 'medium' and 'low' economic motivation category, respectively.

It is seen from Table 1 that 58.22 per cent of the respondents were in 'high' scientific orientation category. However, 29.78 and 12.00 per cent had 'medium' and 'low' scientific orientation category, respectively. However, 53.78 per cent of the respondents were in 'medium' innovativeness category. However, 40.44 and 5.78 per cent had 'high' and 'low' innovativeness category, respectively.

B) Overall adoption level of pomegranate growers about pest management

The data in Table 2 shows that the 44.89, 50.67 and 40.89 per cent respondents had 'low' adoption about control of shot hole borer, pomegranate butterfly and thrip in pomegranate. However, 48.44, 32.00 and 24.89 per cent had 'medium' adoption level about control of thrips, pomegranate butterfly and shot hole borer. The data further reveal that, more than half (57.78, 60.89 and 71.55 %) respondents had 'low' adoption with respect to control of fruit sucking moth, sucking pest and root knot nematode, respectively in pomegranate.

1. Control of shot hole/pinhole borer

The data regarding adoption status of the respondents about control of shot hole borer is depicted in Table 3.

The results presented in Table 61 indicate that the majority of the pomegranate growers had not adopted practices like removal of infested trees (64.44 %), prophylactic measure, application of geru+ chemical paste (44.89 %), drenching with azadirachtin (55.56 %). While, more than two-third (72.44 %) had 'partial adoption' about spraying of chloropyrifos or lindane for control of shot hole borer.

2. Control of pomegranate butterfly

The data pertaining to the adoption of management practices to control the pomegranate butterfly was collected and presented as shown in Table 4.

Table 4 reveals that the majority of the pomegranate growers had not adopted recommended practices for control of pomegranate butterfly *viz.*, removal of flowering weeds (57.78 %), neem seed kernel extract (50.62 %) spraying of cypermethrin or emamectin benzoate (72.89 %), spraying of deltamethrin after fruit set (59.11 %). However, two-fifth of them had 'partial adoption' with respect to spraying of deltamethrin after fruit set.

3. Control of thrips

The data regarding the adoption of management practices to control the pomegranate thrips by the pomegranate growers was collected and presented as shown in Table 5.

The data presented in Table 5 shows that the majority 99.11, 61.33 and 57.78 per cent of the respondents had not adopted practices like spraying of methyl oxydematon, spraying of spinosad and biopesticides spray of NSKE or verticilliumleccani, respectively. While, 69.33 per cent of them had 'partial adoption' about spraying of dimethoate or spinosad.

4. Control of pomegranate aphids and sucking pests

This is becoming major pest now days on pomegranate in some parts of Maharashtra and Karnataka. The data regarding adoption status of the respondents about control of sucking pests is depicted in Table 6.

The data presented in Table 6 shows that the majority of the respondents had not adopted practices like *viz.*, spraying of imidacloprid for control of aphids in pomegranate (47.56 %), use of yellow sticky cards (83.56 %), spraying of *Verticillium leccani* (57.78 %) and spraying of malathion/dimethoate after 50 % fruit set (50.67 %), respectively. However, an equal proportion of the respondents adopted spraying of imidacloprid for control of aphids in pomegranate and spraying of malathion/dimethoate after 50 % fruit set for control of sucking pest in pomegranate.

5. Control of fruit sucking moth and root knot nematode

The data regarding the adoption of management practices by pomegranate growers about control of fruit sucking moth and root knot nematode was collected and presented as shown in Table 7. The results presented in the Table 7 reveal that, more than two-third of the respondents not adopted the plant protection measures collection and destruction of moths use of light trap, plantation of *zendu* as trap crop, use of biopesticides-trichoderma, pseudomonas FL, respectively. With regard to control of root knot nematode 44.44 per cent and 37.78 per cent had 'partial adoption' regarding the application of phorate + neem cake, and use of biopesticidestrichoderma, pseudomonas FL, respectively.

Conclusion

It is observed from the study that majority of the pomegranate growers had not adopted practices like removal of infested trees (64.44 %), prophylactic measure, application of geru+ chemical paste (44.89%), drenching with azadirachtin (55.56 %) with regards to control of shot hole borer/ pinhole borer. The pomegranate growers had not adopted recommended practices for control of pomegranate butterfly *viz.*, removal of flowering weeds (57.78 %), neem seed kernel extract (50.62 %) spraying of cypermethrin or emamectin benzoate (72.89 %), spraying of deltamethrin after fruit set (59.11 %). Further, majority of the respondents (99.11, 61.33 and 57.78 per cent) had not adopted practices like

spraying of methyl oxydematon, spraying of spinosad and biopesticides spray of NSKE or verticilliumlecani, respectively for control of thrips in pomegranate. More than two-third of the respondents not adopted the plant protection measures collection and destruction of moths use of light trap, plantation of *zendu* as trap crop, use of

biopesticides-trichoderma, pseudomonas FL, respectively for control of fruit sucking moth and root knot nematode. Accordingly, it can be concluded that pomegranate growers not adopted most of the recommended practices for control of various pest. This might be due lack of knowledge and awareness.

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Table No 1: Distribution of pomegranate growers according to their personal traits.

Sl. No.	Characteristics (s)	Respondents (N= 225)	
		Number	Percentage
	Age (yrs)		
1.	Young (upto 35 years)	74	32.89
2.	Middle Aged (36to 50 years)	125	55.56
3.	Old(51andabove years)	26	11.55
	Education		
1.	Pre-Primary (Std. I to IV)	45	20.00
2.	Primary (Std. V to VII)	04	01.78
3.	Secondary (Std. VIII to X)	49	21.78
4.	Higher Secondary (Std. XI to XII)	45	20.00
5.	Higher (Degree and more)	82	36.44
	Socio-economic status		
1.	Very low (Up to 05.21)	19	08.45
2.	Low (05.22 to 08.37)	41	18.22
3.	Medium (08.38 to 11.52)	49	21.78
4.	High (11.53 to 14.67)	57	25.33
5.	Very high (14.68 and above)	59	26.22
	Cosmopliteness		
1.	Low (up to 3 score)	55	24.44
2.	Medium (4 score)	65	28.89
3.	High (5 & above score)	105	46.67
	Annual income		
1.	Up to 4,00,000/-	47	20.89

2.	400001/- to 700000/-	93	41.33
3.	700001/- to 1000000/-	45	20.00
4.	10,000,00/- & above	40	17.78
Land holding			
1.	Marginal (Upto2.00ha)	23	10.22
2.	Small (2.01–4.00ha)	87	38.67
3.	Mediumfarmers (4.01–10.00ha)	72	32.00
4.	Bigfarmers (10ha and above)	43	19.11
Area under pomegranate cultivation			
1.	Marginal farmers (Upto 2.0)	57	25.33
2.	small farmers (2.01 – 5.00)	117	52.00
3.	Mediumfarmers (5.01 – 7.50)	32	14.22
4.	Bigfarmers (7.51 & above)	19	08.45
Farming Experience			
1.	Up to 7 yrs.	119	52.89
2.	8 to 12 yrs.	73	32.44
3.	13 yrs& above	33	14.67
Economic motivation			
1.	Low (up to 18 score)	30	13.33
2.	Medium (19 to 23 score)	59	26.22
3.	High (24 & above score)	136	60.45
Scientific orientation			
1.	Low (up to 19 score)	27	12.00
2.	Medium (20 to 24 score)	67	29.78
3.	High (25 & above score)	131	58.22
Innovativeness			
1.	Low (up to 12 score)	13	05.78
2.	Medium (13 to 17 score)	121	53.78
3.	High (18 & above score)	91	40.44

Table 2.Overall adoption levelabout pest management

Sl. No.	Category	Respondents (N= 225)	
		Number	Percentage
1. Control of shot hole borer / pinhole borer			
1.	Low (up to 14 score)	101	44.89
2.	Medium (15 to 18 score)	56	24.89
3.	High (19 & above score)	68	30.22
Total		225	100.00
Maximum score=23		Minimum score=10	
2. Control of pomegranate butterfly			
1.	Low (up to 11 score)	114	50.67
2.	Medium (12 to 14 score)	72	32.00
3.	High (15 & above score)	39	17.33
Total		225	100.00
Maximum score=16		Minimum score=8	
3. Control of thrips			
1.	Low (up to 8 score)	92	40.89
2.	Medium (9 to 11 score)	109	48.44
3.	High (12 & above score)	24	10.67
Total		225	100.00
Maximum score= 13		Minimum score=5	
4. Control of pomegranate aphids			
1.	Low (up to 1 score)	70	31.11
2.	Medium (2 score)	106	47.11
3.	High (3 & above score)	48	21.33
Total		225	100.00
Maximum score=3		Minimum score=2	
5. Control of mealy bug / scale insect / white fly (sucking pests)			
1.	Low (up to 4 score)	130	57.78

2.	Medium (5 score)	56	24.89
3.	High (6 & above score)	39	17.33
	Total	225	100.00
Maximum score=7		Minimum score=3	
6. Fruit sucking moth		Number	Percentage
1.	Low (up to 3 score)	161	71.55
2.	Medium (4 score)	36	16.00
3.	High (5 & above score)	28	12.45
	Total	225	100.00
Maximum score=5		Minimum score=2	
7. Control of root knot nematode		Number	Percentage
1.	Low (up to 5 score)	137	60.89
2.	Medium (6 to 7 score)	85	37.78
3.	High (8 & above score)	03	01.33
	Total	225	100.00
Maximum score=8		Minimum score=3	

Table 3: Distribution of respondents according to practicewise adoption about control of shot hole/pinhole borer

Sl. No.	Particulars	Complete adoption	Partial adoption	No adoption	Overall (N=225)
1.	Removal of infested trees from the main field	27 (12.00)	53 (23.56)	145 (64.44)	225 (100.00)
2.	Spraying of Chloropyriphos 2.5 ml/lit or lindane 2.5 ml/lit of water	30 (13.33)	163 (72.44)	32 (14.22)	225 (100.00)
3.	Drenching of main trunk with a mixture of Chlorpyriphos 20EC 2.5ml+Tridemorph 1ml /lit @ 2-3 lit / plant After three weeks repeat with Monocrotophos 1.5 ml+ Carbendazim @ 5g/lit.	17 (07.56)	86 (38.22)	122 (54.22)	225 (100.00)
4.	During low infestation Drenching with Azadirachtin (0.15%) 3 ml/lit @ 2-3 lit/plant with Carbendazim @ 5g/lit.	0 (0.00)	100 (44.44)	125 (55.56)	225 (100.00)
5.	Prophylactic measure once in six months -Drench soil with Chlorpyriphos 0.05% -Spray Quinalphos 0.06% followed by Azadirachtin 1500ppm 3 ml/lit.	39 (17.33)	85 (37.78)	101 (44.89)	225 (100.00)
6.	Pesticide mixture paste is used for application on main trunk Application of paste of 400 g geru in 1 lit water (soak for overnight) + 2.5 ml lindane (20 EC) or 5 ml Chloropyriphos (20 EC) + 2.5 g/ lit Copper Oxychloride on main trunk	92 (40.89)	14 (14.22)	101 (44.89)	225 (100.00)
7.	Pomegranate field kept well aerated	100 (44.44)	40 (17.78)	85 (37.78)	225 (100.00)

(Figures in the parentheses indicate percentages)

Table 4: Distribution of respondents according to practicewise adoption about control of pomegranate butterfly

Sl. No.	Particulars	Complete adoption	Partial adoption	No adoption	Overall (N=225)
1.	Adoption of spraying at flowering stage	127 (56.44)	98 (43.56)	0 (0.00)	225 (100.00)
2.	Removal of all the affected parts (fruits with exit holes) immediately	39 (17.33)	56 (24.89)	130 (57.78)	225 (100.00)
3.	Spraying of Deltamethrin 0.002 % or Carbaryl 50 WDP after 50 % fruit set	0 (0.00)	92 (40.89)	133 (59.11)	225 (100.00)
4.	Spraying of Cypermethrin 0.0075 % or Fenvalerate 0.005 % or Quinalphos 0.06 % or Emamectin benzoate 05 SG	0 (0.00)	61 (27.11)	164 (72.89)	225 (100.00)

	0.5ml/lit				
5.	Removal of flowering weeds in the field	84 (37.33)	56 (24.89)	85 (37.78)	225 (100.00)
6.	Biopesticides - Spraying of 5 % NSKE	79 (35.11)	32 (14.22)	114 (50.62)	225 (100.00)

(Figures in the parentheses indicate percentages)

Table 5: Distribution of respondents according to practicewise adoption about control of thrips

Sl. No.	Particulars	Complete adoption	Partial adoption	No adoption	Overall (N=225)
1.	Spraying of Dimethoate 0.06 % or Monocrotophos .03 % or Spinosad 45 SC 0.25 ml/lit prior to flowering	21 (09.34)	156 (69.33)	48 (21.33)	225 (100.00)
2.	Spraying of Methyl oxydematon 0.05 % after fruit set	0 (0.00)	02 (0.89)	223 (99.11)	225 (100.00)
3.	Proper spraying time – Evening hours	54 (24.00)	107 (47.56)	64 (28.44)	225 (100.00)
4.	Follow up spray - Spinosad 45 SC 2.5 ml/lit	34 (15.11)	53 (23.56)	138 (61.33)	225 (100.00)
5.	Biopesticides / Biological control - Spraying of 5 % NSKE - Spraying with <i>Verticilliumlecanii</i> (2x105 CFU/g) @ 2 g/lit	38 (16.89)	57 (25.33)	130 (57.78)	225 (100.00)

(Figures in the parentheses indicate percentages)

Table 6: Distribution of respondents according to practicewise adoption about control of pomegranate aphids and sucking pests

Sl. No.	Particulars	Complete adoption	Partial adoption	No adoption	Overall (N=225)
	Control of pomegranate aphids				
1.	Spraying of Dimethoate 0.06 % or Imidacloprid 0.03 ml/lit or Spinosad 45 SC 0.25 ml/lit after emergence of new shoots	48 (21.33)	70 (31.11)	106 (47.56)	225 (100.00)
	Control of mealy bug / scale insect / white fly				
1.	White Fly - Yellow coloured sticky cards	0 (0.00)	37 (16.44)	188 (83.56)	225 (100.00)
2.	Spraying with <i>Verticilliumlecanii</i> (6x105 CFU/g) WP @ 6g + 5 ml Milk / lit	24 (10.67)	71 (31.56)	130 (57.78)	225 (100.00)
3.	Spraying of Malathion 0.1% or Dimethoate 0.08% or Dichlorovos 0.05% after 50 % fruit set	39 (17.33)	72 (32.00)	114 (50.67)	225 (100.00)

(Figures in the parentheses indicate percentages)

Table 7: Distribution of respondents according to adoption about control of fruit sucking moth and root knot nematode

Sl. No.	Particulars	Complete adoption	Partial adoption	No adoption	Overall (N=225)
	Fruit sucking moth				
1.	Use light trap during night	0 (0.00)	56 (24.89)	169 (75.11)	225 (100.00)
2.	Collection and destruction fruit sucking moths	37 (16.44)	18 (08.00)	176 (75.56)	225 (100.00)
	Control of root knot nematode				
1.	Application of Phorate 10 G 25 g /plant + Furdan (Carbofuraon) 65 g/plant + Neem cake 3 kg/plant at the time of bahar / resting peiod	88 (39.11)	100 (44.44)	37 (16.44)	225 (100.00)
2.	Plantation of trap crop – 2-4 Zendu in between rows	0 (0.00)	55 (24.44)	170 (75.56)	225 (100.00)
3.	Bio-pesticides - Trichoderma 20 g/plant PseudomaonasFluorescence	03 (01.33)	85 (37.78)	137 (60.89)	225 (100.00)

(Figures in the parentheses indicate percentages)