COMMUNICATION GAP REGARDING PLANT PROTECTION, HARVESTING AND POST-HARVEST TECHNOLOGIES AMONG THE MANGO GROWERS

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Mango is one of the important and favorite fruits of Pakistan. However, its yield per hectare is very low in the country as compared to potential yield. This might be due to many factors including non-adoption of plant protection, harvesting and post-harvest technologies by mango growers. These factors not only affect the yield but the quality of the fruit. Therefore, the present study was designed to assess communication gap regarding plant protection, harvesting and post-harvest technologies among mango growers of tehsil Muzaffargarh. Out of 33 rural union councils, five union councils were selected randomly, one from each markaz. Two villages were selected at random from each selected union council. Fifteen mango growers were selected from each selected village by random sampling technique. The data were collected through interview schedule and were analyzed with the help of statistical package for social sciences (SPSS).
Key words: Communication gap, mango, plant protection, harvesting and post-harvest technology

INTRODUCTION

Nature has endowed Pakistan with wide range of agro-climatic conditions, which permit quality production of both tropical and temperate fruits. The climate of Pakistan is favorable to all types of fruits. Mango is the second major fruit crop of Pakistan after citrus (Govt. of Pak., 2005-06), and is ranked fourth in the world for its production (FAO, 2005). Pakistan produces 8.5% of world's mango and exports to Middle East, Iran, Germany, Japan, China and Hong Kong (Pakissan.com.2007).

About 1595 varieties of mangoes are known in the entire world. Out of these about 60 cultivars are available in the germplasm collection block of Central Institute for Subtropical Horticulture, Lucknow which is the biggest collection in the world (Srivastava, 2003). However, only 25 to 30 cultivars of mangoes are grown on commercial scale. The principle commercial cultivars of Pakistan are: Chaunsa, Dashehari, Anwar Ratul, Gulab-e-Khas, Langra, Siroli, Sindhri, Swarm, Rekha, Zafran (Chadha and Pal, 1993), Sindhri, Maldha, Fajri.

During the year 2005-06, area of Pakistan under mango cultivation was 156.6 thousand hectares with the production of 17537.7 thousand tonnes and an average yield of 11.20 tonnes per hectare (Govt. of Pak., 2005-06). But the output this year has been substantially low i.e. 9-10 tonnes per hectare. It is about 50% of the potential yield, which is 20 tonnes per hectare (Shahid, 2006). So, there is a significant difference between average and potential yields.

The mango industry is facing some challenging problems like alternate bearing, unreliable fruit setting and attack of fungi, insects/pests and diseases. Among these malformation is more damaging and so far unpredictable in its occurrence. Among the cultivars and varying climatic as well rhizospheric afflicts both floral and vegetative shoots (Kumar & Beniwal, 1991). But the incidence of floral malformation is more important than the vegetative malformation as the malformed panicle is unproductive (Chadha & Pal 1993). Malformed panicle, seldom set fruit and ultimately dry up and persist as such on the tree for a long time. In cute cases, the whole tree may be rendered fruitless (Singh & Singh, 1993).

The low per hectare yield may be attributed to lack of effective control of insect/pests like mango hopper, mango mealy bug, mango scale insect, mites, mango thrips, mango midge, termites, fruit fly and diseases like sooty mould, die back of mango, anthracnose, mango malformation, powdery mildew of mango, mango root rot, bacterial blight, sudden death (quick decline of mango), and black leaf spot of mango. These insects/pests and diseases not only affect the yield of mango but also deteriorate the fruit quality. Lack of information about recommended harvesting and post-harvest technologies on the part of growers are other factors that affect the quality of mango. All these factors relate to communication gap which is directly associated with the guidance provided by various extension agencies and other sources. A number of public and private agencies are involved in extension work. These are mainly responsible for dissemination of improved mango protection, harvesting and post-harvest technologies among the mango growers. Keeping in view the above-mentioned facts, the present study was designed to assess the communication gap regarding plant protection, harvesting and post-harvest technologies among mango growers of tehsil Muzaffargarh.

MATERIALS AND METHODS

Tehsil Muzaffargarh was taken as the study area. It consists of five markaz, each having seven union councils. Out of 33 rural union councils, five union councils, one from each markaz, were selected randomly. Two villages were selected at random from each selected union council. Fifteen mango growers were selected from each selected village by random sampling technique thereby making a sample of 150 respondents. In order to collect the required information, an interview schedule was developed. The data were analyzed with the help of SPSS (Statistical Package for Social Sciences). Descriptive analysis such as frequencies and percentages were used for interpretation of the data.

RESULTS AND DISCUSSION

The data displayed in Table 1 indicates that all the respondents were aware of mango hopper, mango scale insect, mango thrips and termites. A vast majority (98.0%) was familiar with mango mealy bug, mango midge and fruit fly. Similarly, 88.7% of the respondents were aware of mites. Almost similar results were achieved by Hassan (1991).

Table 1. Awareness status of the respondents regarding insects/pests and diseases of mango

Insects/Pests	Awareness	
	No.	%
Mango hopper	150	100.0
Mango mealy bug	147	98.0
Mango scale insect	150	100.0
Mites	133	88.7
Mango thrips	150	100.0
Mango midge	147	98.0
Termites (white ant)	150	100.0
Fruit fly	147	98.0
Diseases		
Sooty mould	123	82.0
Die back of mango	126	84.0
Anthracnose	135	90.0
Mango malformation	147	98.0
Powdery mildew of mango	150	100.0
Mango root rot	105	70.0
Bacterial blight	95	63.3
Sudden death (quick decline) of mango	147	98.0
Black leaf spot of mango	142	94.7

The data in Table 1 further show that all the respondents were aware of powdery mildew of mango. A vast majority (98.0, 98.0, 94.7 and 90.0%) of the respondents was familiar with diseases like mango malformation, black leaf spot of mango and anthracnose, respectively. While mangos root rot and sudden death were known to 70.0 and 63.3% of the respondents, respectively.

The data presented in Table 2 show that an overwhelming majority (97.3, 93.3, 92.7, 95.3 and 92.7%) of the respondents was aware of cultural control measures such as recommended method and time for transplanting of mango nursery plants, using disease free nursery plants, ploughing under shadow of tree, hoeing and weeding, and removal of crop residues, respectively. However, the adoption level of these practices was slightly lower than awareness.

The data given in Table 2 further depict that an overwhelming majority (95.3 and 99.3%) of the respondents knew mechanical control measures like destruction of diseased plants/plant parts and pruning and removing of disease shoots, respectively. Similarly, 68.7 and 68.0% were familiar with the use of plastic bands against mango mealy bug, and hand collection and burning of mango mealy bug, respectively. Drum beating was known to only 62.0% of the respondents. The adoption data show that destruction of diseased plants/plant parts and pruning and removing of disease shoots were adopted by 90.0 and 92.0% of the respondents, respectively. While, 63.3 and 64.0% of the respondents had adopted plastic bands against mango mealy bug, and hand collection and burning of mango mealy bug, respectively. Whereas, only 40.0% of the respondents used drum beating. However, the adoption level of all these practices was relatively lower than the awareness.

The data presented in Table 2 further indicate that 90.0, 82.0, 81.3 and 80.0% of the respondents were aware of Acetameprid, Imeda Chloprid 200 SL, Deltamethrin and Bifenthrin, respectively as recommended pesticides for sucking insects/ pests of mango. While Diazinon was known to 70.0% of the respondents, whereas Malathion 57EC and Methidiathion 40EC were known to only 26.0 and 22.0% of the respondents, respectively. The adoption data indicate that Acetameprid, Imeda Chloprid 200 SL, Bifenthrin and Deltamethrin were adopted by 84.7, 76.7, 76.0 and 64.7% of the respondents, respectively. Whereas, Malathion and Lambda were adopted by only 23.3 and 18.7% of the respondents, respectively. The adoption level of Methidiathion 40EC was negligible (9.3%).

Table 2. Awareness and adoption status of respondents regarding recommended plant protection measures

Cultural control	Awareness		Adoption	
	No.	%	No.	%
Using recommended method and time for transplanting of mango nursery plants	146	97.3	135	90.0
Using disease free nursery plants	140	93.3	129	86.0
Ploughing under shadow of trees	139	92.7	129	86.0
Hoeing and weeding	143	95.3	140	93.3
Removal of crop residues	139	92.7	123	80.0
Mechanical control				
Destruction of diseased plants/plant parts	143	95.3	135	90.0
Pruning and removing of disease shoots	149	99.3	139	92.7
Use of plastic bands against mango mealy bug	103	68.7	95	63.3
Hand collection and burning of mango mealybug	102	68.0	96	64.0
Drum beating	93	62.0	60	40.0
Chemical control				
Insecticides/pesticides for sucking insects/ pests				
Supracide @175 ml/ 100 lit. of water	73	48.7	72	48.0
Chlorpyrifos 40EC @ 250ml/ 100 lit. of water	93	62.0	67	45.7
Diazinon (Basudin 60 EC) @ 200 ml/100 lit. of water	106	70.0	74	49.3
Acetameprid (Rani/ Mospilan 20 SP) 100 gm/100 lit. of water	135	90.0	127	84.7
Imeda Chloprid 200 SL @ 50ml/100 lit. of water	123	82.0	115	76.7
Lambda-cyhalothrin (Karate 2.5EC) @ 40 ml/100lit.of water	96	64	28	18.7
Methidiathion 40EC @ 150 ml/100 lit. of water	33	22.0	14	9.3
Methyleparathion50EC@200 ml/100 lit. of water	66	44.0	40	26.7
Tri-chlorpyrifos 80EC @ 200gm/100lit. of water	84	56.0	75	50.0
Triazophos 40EC@ 150 ml/100 lit. of water	84	56.0	64	49.7
Malathion 57EC @250 ml/100 lit. of water	39	26.0	35	23.3
Cypermethrin 10EC@10 0 ml/100 lit. of water	68	45.3	47	31.3
Endosulfan (Thiodan 35EC) @200 ml/100 lit.ofwater	75	50.0	62	41.3
Beta-cyfluthrin@50ml/100 lit of water	106	70.0	95	63.3
Bifenthrin Talstar (10EC) @ 20 ml/100 lit. of water	120	80.0	114	76.0
Deltamethrin (Decis 2.5 EC) @40ml/100 lit. of water	122	81.3	56	64.7
Insecticides for gall forming insects				
Imeda Chloprid 200 SL @ 50ml/100 lit. of water	80	53.3	75	50.0
Methidiathion 40EC @ ml/100lit.of water	63	42.0	56	37.3
Triazophos 40EC@ 150 ml/100 lit. of water	84	56.0	69	46.0
Malathion 57EC @250 ml/100 lit.of water	64	42.7	7	4.7
Insecticides for wood boring insects				
Chlorpyrifos 40EC @ 250ml/ 100 lit. of water	97	64.7	89	59.3
Insecticides/ pesticides for fruit insects/pests				
Malathion 57EC @250 ml/100 lit.of water	69	46.0	56	37.3
Cypermethrin 10EC@10 0 ml/100 lit. of water	116	77.3	90	60.0
Tri-chlorpyrifos 80EC @ 200gm/100lit.of water	94	62.7	82	54.7
Fungicides for diseases				
Precure combi @2gm/ lit of water	55	36.7	7	4.7
Topas @ 0.5cc/lit of water	126	84.0	124	82.7
Topsin-M.70 W.P.@2gm /lit of water	124	82.7	114	76.0
Antracol @2-2.5 gm /lit of water	98	65.3	94	62.7
Bordeaux mixture@ 4:4:50	84	56.0	49	32.7
Score@ 0.3cc/lit of water	74	49.3	57	38.0
Cupravit 50.W.P.@ 2-2.5 gm /lit of water	84	56.0	56	37.3
Shin car@ 2ml/ lit of water	86	57.0	60	40.0
Biological control				
Pheromone Trap @4-6 traps/Acre only for fruit fly	141	94.0	141	94.0

The data presented in Table 2 also show that 56.0 and 53.3% of the respondents were aware of Triazophos 40EC and Imeda chloprid 200 SL, while these chemicals were adopted by 46.0 and 50.0% of the respondents, respectively. However, Malathion 57EC was known to only 42.7% and was adopted by a negligible number (4.7%) of the respondents. Whereas, Chlorpyrifos 40EC was known to 64.7% and was adopted by 59.3% of the respondents, as chemical control for wood boring insects.

Table 2 also reveals that majority (77.3%) of the respondents was aware of Cypermethrin 10EC and it was adopted by 60.0% of the respondents. While 62.7% of the respondents were aware of Tri-chlorpyrifos 80EC @ and it was adopted by 54.7% of the respondents. Whereas, Malathion 57EC was known to 46.0% and was adopted by lesser number (37.3%) of the respondents.

Table 2 further reveals that a vast majority (84.0 and 82.7%) of the respondents was aware of Topas and Topsin-M.70 W.P and 82.7 and 76.0% of them had adopted these chemicals, respectively. While, only 36.7% of the respondents were aware of Precure combi and it was adopted by a negligible number (4.7%) of the respondents. Pheromone Trap was known to an overwhelming majority (94.0%) and was adopted by all of them as biological control for fruit fly.

The data presented in Table 3 show that 90.7% of the respondents were aware of tapka stage, as an appropriate harvesting time for mango and all of them had adopted the recommendation. In case of time of harvesting, the awareness ranged from 72.0- 95.3% for different varieties of mango.

The data in Table 3 further show that a vast majority (95.3%) knew both methods of harvesting i.e. using 'chhikha' and with the help of scissors. The adoption of both the methods was also very high (above 80.0%). The data reveal that manual grading was known to 76.0% and was adopted by 64.7% of the respondents. While, the grading with the help of grader was known to only 13.7% and was adopted by a negligible number (4.7%) of the respondents, which clearly indicates a big awareness and adoption gap.

The data about packing indicate that a vast majority (94.7%) was aware of packing of mango in wooden boxes with paper, while only 33.3% of the respondents had adopted it. Whereas only 18.7% of respondents were aware of packing of mango in cardboard boxes and a negligible number (6.0%) of the respondents had adopted it. It clearly depicts a big awareness and adoption gap with regard to packing of mango in cardboard boxes.

The data given in Table 3 further show that a vast majority (94.0%) of the respondents was aware of storage in open place and 70.7% of the respondents had adopted it. While, storage in ambient temperature was known to 70.7% of the respondents and it was adopted by only 22.7%, which shows a huge gap between awareness and adoption. Only 9.3% of the respondents were aware of storage of mango in cold storage. None of the respondents had used the cold storage.

An overwhelming majority (96.0%) of the respondents was aware of natural ripening of mango and 60.7% had adopted it. The ripening of mango with the treatment of Calcium Carbide (CaC2) was known to 60.7% and was adopted by 36.7% of the respondents. Whereas, ripening of mango with treatment of Ethylene was known to only 10.7% and a negligible number (4.0%) of the respondents had adopted it.

CONCLUSIONS

An overwhelming majority of the respondents was familiar with most of insects/pests and diseases of mango. However, mango root rot and sudden death were known to relatively lesser number. A vast majority of the respondents was aware of and had adopted cultural control measures. Similarly, an overwhelming majority knew mechanical control measures. Majority was familiar with the use of plastic bands against mango mealy bug, and hand collection and burning of mango mealy bug. Drum beating was known to only 62.0% of the respondents. However, the adoption level of all these practices was relatively lower than the awareness.

A vast majority of the respondents was aware of Acetameprid, Imeda Chloprid 200 SL, Deltamethrin and Bifenthrin. Diazinon was known to a large majority of the respondents, whereas Malathion 57EC and Methidiathion 40EC were known to more or less one-fourth of the respondents, and were adopted by relatively lesser number. The adoption level of Methidiathion 40EC was negligible. The data show that slightly more than half the respondents were aware of Triazophos 40EC and Imeda chloprid 200 SL were known to and adopted by relatively lesser number of the respondents, Malathion 57EC was known to 42.7% and was adopted by only 4.7% of the respondents. Chlorpyrifos 40EC was known to and adopted by a majority of the respondents.

A large majority of the respondents was aware of Cypermethrin 10EC and it was adopted by relatively lesser number of the respondents. Similarly majority of the respondents was aware of Tri-chlorpyrifos 80EC and it was adopted by relatively lesser number of the respondents.

Table 3. Awareness and adoption status of respondents regarding harvesting and post-harvest technology of mango

Harvesting and Post Harvest Technology	Awareness		Adoption	
	No.	%	No.	%
Tapka stage	136	90.7	136	90.7
Time of harvesting				
Early varieties				
Malda (end June – start July)	143	95.3	118	78.7
Langra (end June – start July)	122	81.3	102	68.0
Dusehri (end June –start July)	130	86.7	121	80.7
Medium varieties				
Sindhri (July)	123	82.0	115	76.7
Anwar Ratool (July)	114	76.0	97	64.7
Late varieties				
Fajri (August-September)	108	72.0	86	57.3
Samar Bahisht Chaunsa (August-September)	129	86.0	108	72.0
Sensation (August-September)	143	95.3	123	82.0
Method of harvesting/ picking				
By using chhikha	143	95.3	121	80.7
With the help of scissors	143	95.3	122	81.3
Grading				
Manually	114	76.0	97	64.7
With the help of grader	20	13.3	7	4.7
Packing				
Use of wooden boxes with paper	142	94.7	50	33.3
Use of cardboard boxes	28	18.7	9.0	6.0
Storage				
Use of cold storage	44	29.3	0.0	0.00
Use of open places	141	94.0	106	70.7
Ambient temperature	106	70.7	34	22.7
Ripening of mango				
With the treatment of Calcium Carbide (CaC_2)	91	60.7	55	36.7
With the treatment of Ethylene	16	10.7	6	4.0
Natural ripening	144	96.0	91	60.7

A vast majority of the respondents was aware of and had adopted Topas and Topsin-M.70 W.P. Only 36.7% of the respondents were aware of Precure combi and its adoption was negligible. Pheromone Trap was known to and adopted by an overwhelming majority.

In case of time of harvesting, the awareness ranged from 72.0- 95.3% for different varieties of mango. A vast majority was aware of mango packing in wooden boxes with paper, while only one-third of the respondents had adopted it. Only 18.7% of respondents were aware of packing of mango in cardboard boxes and a negligible number of the respondents had adopted it. It clearly depicts a big awareness and adoption gap with regard to packing of mango in cardboard boxes.

The grading with the help of grader was known to only 13.7% and its adoption was negligible, which clearly indicates a big awareness and adoption gap. There was also a big adoption gap with regard to packing of mango. Storage in ambient temperature was known to majority of the respondents but it was adopted by only 22.7%, which shows a huge gap between awareness and adoption. Only 9.3% of the respondents were aware of storage of mango in cold storage while its adoption was nil. Ripening of mango with treatment of Ethylene was known to only 10.7% and a negligible number of the respondents had adopted it.

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