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Adoption of post-harvest practices of kinnow (*Citrus deliciosa*) by farm women in Sri Ganganagar district of Rajasthan

Aastha Khatri, Sangeeta Sharma and Anjali Juyal

Abstract
The present study was carried out in purposively selected four villages in Sri Ganganagar and Sri Karanpur Panchayat Samities of Sri Ganganagar district with the objective to study the adoption of post-harvest practices of Kinnow (Citrus Deliciosa) by farm women in Sri Ganganagar district of Rajasthan. The total sample consisted of 100 farm women selected from four villages of selected Panchayat Samities. Personal interview technique was used for data collection. Frequency, percentage and mean per cent scores were used for analysis of data. The findings revealed that the overall MPS of adoption was poor (28.80). Component wise adoption of post –harvest practices showed that respondents had medium level of adoption in plucking (56.5MPS) & grading (35.0MPS). In other activities like washing & cleaning (26.0MPS), packaging (22.72MPS), storage (19.71MPS), marketing (11.14MPS), transportation (9.0MPS) respondents had low level of adoption.

Keywords: Adoption, post-harvest practices

Introduction
India is blessed with various types of soils and varied agro-climatic conditions as a result of which the country has the advantages of growing a variety of horticultural crops in particular and other crops in general. India has made a fairly good progress on the horticultural map of the world with a total production touching over 152.5 million Tonnes during 2000-01. At present, India is the largest producer of fruits (45.4 million Tonnes) and the second largest of vegetables (93.9 million Tonnes) in the world, next to China. Its share in the world production of fruits is 9.7 percent and vegetables 13.6 percent. According to National Horticulture Board, Indian fruit basket comprises tropical fruits like mango, banana, citrus, apple, pear, peach, papaya, guava, sapota, and grape, walnut among the temperate fruits and *ber*, *anola*, pomegranate, fig, *phalsa*, among the arid zone fruits. Among all fruits citrus is world's leading fruit crop. Citrus fruits are not only loaded with vitamin C, they also strengthen our immune system. Lime, Lemon, Sweet orange & Mandarin cover bulk of the area under this group of fruits. Among the citrus fruits Mandarin is placed at the first position with respect to the area and production. Commercially kinnow mandarin is grown in the states like Punjab, Haryana, Himachal Pradesh, and Western Rajasthan & Uttar Pradesh. Rajasthan is considered to be potential area of fruit growing. In Rajasthan particulary in Sri Ganganagar & Hanumangarh districts, kinnow mandarian is being cultivated on a large scale. The area under kinnow cultivation in Rajasthan is 8290 hectare and production is 157460 metric tonnes with 19.0 metric tonnes productivity (Indian Horticulture Data Base 2009) Women plays an important role in agriculture operations. The overall contribution of farm women in Indian agriculture is roughly estimated to be 70-80 per cent. Majority of them are engaged in the post-harvest operations like harvesting, grading, storage and preservation of farm produce. The participation of farm women in post-harvest activities is reported to be higher as compared to other farm operation. Considering their participation in post-harvest activity, it was felt necessary to know about adopted post-harvest operations. Kinnow fruit is perishable in nature

with low shelflife. *Kinnow* production is highly remunerative but requires proper handling with respect to post-harvest treatments like plucking, grading, washing, waxing storage, packaging, transportation, marketing etc. Use of appropriate post-harvest technologies reduces the post-harvest storage losses, adds value to product and generate employment in village and re-establish agro-industries in rural sector. (Bachmann and Earles 2000) Keeping in the view the present study was conducted with the specific objective to study the adoption of post-harvest practices of kinnow (*Citrus Deliciosa*) by farm women in Sri Ganganagar.

Methods and Materials

The present study was conducted in Sri Ganganagar district of Rajasthan sate. Out of seven panchayt samities two panchayat samiti *viz* Sri Ganganagar and Sri Karanpur were selected purposively on the basis of highest production of kinnow. From each panchayat samiti, two villages were selected on the basis of highest production of kinnow. From Sri Ganganagar panchayat samiti 10Q and 8A Chhoti & from Sri Karanpur Panchayat samiti 4T and 18 H villages were selected. For sample selection village wise list of farm women involved in kinnow cultivation was prepared with the help of Patwari, out of which 25 women were randomly selected from each village constituting the sample of 100 farm women for the study. Interview schedule was used to collect the data through personal interview method. The data collected were then tabulated and analyzed by using suitable statistical measures.

Results and Discussion

Adoption of post-harvest practices of kinnow by farm women

1. Overall Adoption

To know the adoption of post-harvest practices of kinnow, respondents were grouped in three categories of adoption namely low, medium, high on the basis of their mean percent scores. More than half of the respondents (62%) were in low adoption category whereas 38 per cent respondents belonged to the medium adoption category. There was no respondent in high adoption category. The overall MPS of adoption was 28.64

2. Component wise adoption of the post-harvest practices of kinnow by farm women

Table 1 presents component wise adoption of post-harvest practices of Kinnow by rural women. Critical examination of the adoption scores highlights that respondents adopted plucking (56.50MPS) & grading (35.0MPS) practices at medium level. In other activities like washing & cleaning (26.0MPS), packaging (22.72MPS), storage (19.71MPS), marketing (11.14MPS) and transportation (9.0MPS) adoption was very low. Not a single respondent adopted waxing & processing practices this was due to the reason that these practices requires high technical knowledge and were mainly performed by machine.

Table 1: Component wise adoption of the post-harvest practices of kinnow by farm women (N=100)

S. No.	Components	MPS
1.	Plucking	56.50
2	Washing & Cleaning	26.0
3	Grading	35.0
4	Waxing	0
5	Packaging	22.72
6	Storage	19.71
7	Processing	0
8	Marketing	11.14
9	Transportation	9.0

In depth inquiry into adoption of different components of Post-harvest practices of kinnow was made to find out to know that what are specific practices followed by the farm women. The findings are presented as under-

Table 2: Practices adopted by respondents in plucking of kinnow (N=100)

S. No.	Practice	f/%
1	Method of plucking	
a)	Manually	6
b)	By clippers	94
2	Time of plucking	
a)	Late morning	68
b)	Any time	32
3	Month of plucking	
a)	January	84
b)	February	16
4	Care taken at the time of plucking	
a)	Button should remain attach	80
b)	Don't allow fruit to fall directly on ground	20
5	Stage of plucking	
a)	Uniform color development	0
b)	Appropriate size development	100

Regarding adoption of plucking practices table 2 reveals that a vast majority of the respondents (94%) adopted clippers as the best method of plucking kinnow while, discussion it was reported that its use is easy and not much technical knowledge and care is needed while handling it. Very few respondents (6%) used manual method of plucking kinnow which is very old and traditional method. In this method they have to twist fruit in an angel and plucked it with a great care. The results of the study are in conformity with the findings of Siraj (2008) in his study on "Kinnow Value Chain" also reported that majority of the respondents (73.2%)were using clippers for plucking the fruit. Regarding plucking time it was found that 68 per cent respondents were plucking it in late morning and rest 32 per cent were plucking it at any time according to their convenience. Majority of the respondents (84%) were plucking the fruit in the month of January which is ideal time for its plucking and rest 16 per cent respondents were plucking in the month of February. Regarding care at the time of plucking the data indicated that majority of the respondents (80%) plucked the fruit carefully so that button remains attached to the fruit while, 20 per cent were following the practice that fruit should not directly fall directly on the ground.

Table 3: Practices adopted by farm women in washing & cleaning of kinnow **(**N=100)

S. No.	Practices	f/%
1	Do you wash & clean kinnow	
a)	Yes	50
2	Material use in washing	
a)	Plain water	10
b)	Chlorine mix water	0
c	Dry cloth	40

Washing is helpful to remove the soil & surface micro-organism from the fruit. Data in Table 3 show that half of the respondents (50%) were following the practice of washing of the fruit after harvesting. Around 40 per cent of the respondents preferred dry method of cleaning to reduce growth of mold and to minimize economic losses. While, very few respondents (10 %) were using plain water for washing the fruit and rest of the respondents were selling their produce without adopting this practice.

Table 4: Practices adopted by farm women in grading of kinnow (N=100)

S. No.	Practice	f/%*
1	Do you grade kinnow	
a)	Yes	43
b)	No	57
2	Criteria for grading	
a)	On the basis of color	20
b)	On the basis of size	43
c)	By separating rotten & immature kinnow	40
3	Method of grading	
a)	Manually	0
b)	Through machine	43

* Multiple response

Grading was considered as an essential operation to get better price at the market. Table 4 depicts that 43 per cent respondents were grading the fruit. Regarding criteria for grading 43 per cent were grading the fruit on the basis of size, 40 per cent by separating rotten kinnow and 20per cent on the basis of colour of the fruit. Grading can be done by hand and machine. It was found that 43per cent of respondents were using automatic grading machine for grading the fruit as it is very time, space, energy saving method. Findings of the present study are in line with the findings of Siraj (2008) in his study on "Kinnow value chain" reported that near about half of the respondents were grade the product before selling.

Table 5: Practices adopted by the farm women in waxing & packaging of kinnow (N=100)

S. No.	Practices	f/%*
1	Waxing	
1	Do you wax kinnow	
a)	No	100
2	Packaging	
1	Packaging method	
a)	Manually	46
b)	Mechanically	0
2	Packaging material use	
1	Conventional	
a)	Jute	0
b)	Wooden boxes	0
2	Modern material	
a)	Corrugated boxes	46
b)	Poly bags	0
3	Placing of fruit in box	
1)	2-3 layer	45
2)	3-4 layer	45

*Multiple Response

Though waxing helps in reducing water loss and in improving the appearance of the fruit. Still the practice of waxing of kinnow was not followed by all the respondents (100%) because it is done through machine which is very costly. Regarding adoption of packaging practices it was noticed that packaging was done manually by nearly half of the respondents (46%) & they were using corrugated boxes were used as packaging material. They also followed the practice of placing fruit in layers by keeping paddy straws in between the layers.

Table 6: Practices adopted by the farm women in storage of kinnow (N=100)

S. No.	Practice	f/%*
1	Do you store kinnow	
a)	Yes	29
b)	No	71
2	Technique use in storage	
a)	Cool chambers	0
b)	Gunny bags	0
c)	Godown	29
3	Point keep in mind while storage	
a)	Structure should be clean and dry	14
B	Separate rotten fruit	20
c)	Separate new and old stock	29
d)	Proper air and ventilation in storage structure	17

*Multiple response

Regarding storage it was found that majority of the respondents (71%) were not following the practice of storage of kinnow. They were selling the fruit just after harvesting directly in the market. Data further reveals that 29 per cent respondents were storing kinnow in godown During discussion it was found that the facility of cool chambers is available in the area in which they can store the fruit even up to 60 days but, it was very costly. Regarding point to be kept in mind while storage it was found that all these respondents (29%)who used to store the fruits in godown followed the practice of keeping the new and old stock separately, 20 per cent separate the rotten fruit if any at the time of storage and 17 per cent reported that they followed proper air and ventilation in storage structure.

Processing

Regarding adoption of processing practices it was noticed that not a single respondent had adopted this practice because the fruit was generally consumed in fresh form or in the form of fresh juice at domestic level. The reason for poor adoption was lack of knowledge about preparation of processed products.

Table 7: Practices adopted by the farm women in Marketing & Transportation of kinnow (N=100)

S. No.	Practice	f/%
1	Channel use for marketing	
a)	Direct sale	26
2	Place of selling	
a)	Outside village	26
3	Sale at Prevailing price of kinnow	26
	Transportation	
1	Transportation channel	
a)	Canters/Tractor trolley	26
2	Considerations at the time of transportation	
a)	Proper handling at the time of loading	20
b)	Protect fruit from scratches and pressure during loading	26

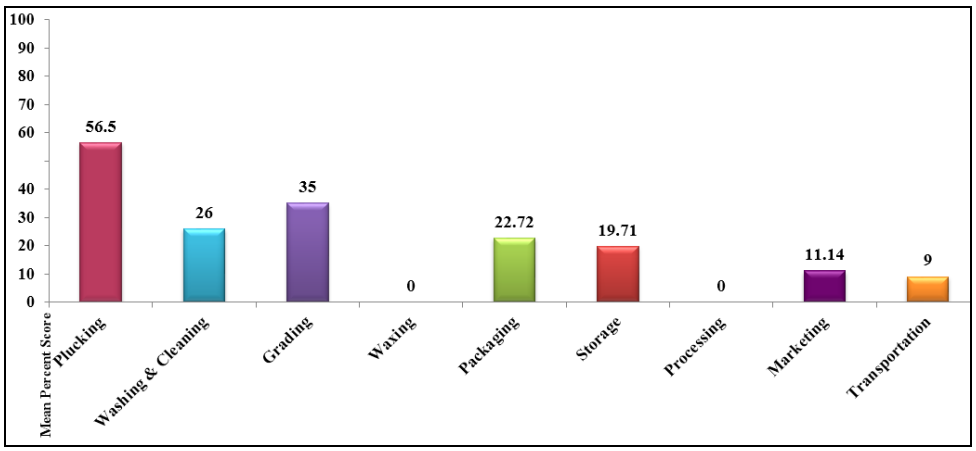

Fig 1: Component-wise adoption of the respondents in different post-harvest practices of *kinnow*

With respect to adoption of marketing practices it is evident from the Table that only 26 per cent respondents were involved in marketing of kinnow. They were selling their produce directly without any middle men, outside village by considering prevailing price of kinnow. For transportation to distant market they were using canters/tractor trolley & protected the fruit from scratches & pressure during loading. Adoption of this practices was found low in respondents due to the reason of male dominant activity.

References

1. Anonymous. Horticulture database 2014, National Horticulture Board, Gurgoan, 2014. Cited from http://apeda.gov.in/apedawebsite/six_head_product/FFV.htm retrieved on 22th January 2019.
2. Bachmann J, Earles R. Post-harvest Handling of Fruits and Vegetables. ATTRA Horticulture Technical Note, 2000, 19. http://www.attra.ncat.org
3. Horticulture Database National Horticulture Board, Ministry of Agriculture, Government of India, Bangalore, 2001.
4. Siraj M. Kinnow value chain. Knowledge for life, 2008, 50-53. Retrived from: www.cabiorg