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Inspirational factors in adoption and production of *Kachri* (C*ucumis callosus)* on large scale in hot arid parts of western Rajasthan: An assessment

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Abstract

The study was conducted in Bikaner district of western Rajasthan and inspirational factors, which encourage the farmers to adopt and produce the *kachri* (C*ucumis callosus)* in hot arid eco-system, *were assessed.* The major inspirational factors which motivate the farmers for the adoption and production of *kachri* on large scale in hot arid eco-system were "substantial income from fresh fruits of *kachri*, substantial income from dried (dehydrated) *kachri*, low cost of cultivation, minimum loss due to the attack of insects and diseases, very low water requirement of the crop, high seed germination capacity of the crop, accessibility of drought hardy local varieties, the vegetables of mature *kachri* fruits is most favorite, *kachri* vegetable has a special test and flavour, its preserved items are most liked and acceptable in the society, high demand of *kachri* fruits in localities/ local markets/villages, high demand of value added products of *kachri* in the markets, very good storage life of the fruit. Among the major factors which restrain the adoption and production of *Kachri* at large scale in hot arid eco-system, were; scarcity of water, very low and erratic rainfall and occurrence of drought very frequently, lack of viable schemes and support system for *kachri* growers, no standardized technique is available for value addition of *kachri*, very deep and salty ground water, inadequate supply of electricity, poor marketing system and market intelligence, lack of knowledge and awareness among the farmers about improved technologies of *Kachri* cultivation.

Key words: *Kachri, inspiration factors, constraints in adoption*

Introduction

Kachri (C*ucumis callosus)* is one of the most important and drought hardy cucurbitaceous vegetable crop of hot arid region of western Rajasthan. It is grown at large scale in hot arid ecosystem of the region during both rainy as well as summer season. It is one of the most important and most favorite vegetable of hot arid region. It is one of the major component crop of mixed cropping system followed in hot arid ecosystem of western Rajasthan. Almost, all the farmers of western part of Rajasthan grow it on their fields as a sole crop or intercrop or mixed crop during *Kharif* and summer season of the year. It is one of the most ancient vegetable crop of the Indian desert and is being grown under extremely harsh climatic conditions at commercial scale. It can give good production even under very low rainfall / limited irrigation, poor soil and other hostile climatic conditions of western Rajasthan. The Central Institute for Arid Horticulture, Bikaner, Rajasthan is working from long back to develop improved technologies to encourage the production of k*achri* crop in harsh climatic conditions. Recently, the Institute has developed two improved varieties (AHK-119 and AHK-200) and other agro-techniques of production which become the boon for the farmers of the hot arid zones.

The farmers of Bikaner district of western Rajasthan adopt and produce k*achri* at large scale during k*harif* and summer season and earn a lot of money and other benefits from it. It is one of the major component crop of their cropping system, particularly of their mixed cropping system. However, the actual reasons which inspire the farmers to produce k*achri* at large scale in hot arid ecosystem of Bikaner district are not yet crystal-clear. Keeping these facts in mind, this study was conducted in Bikaner district of western Rajasthan with the following objectives:

1. To assess factors which inspire the farmers for adoption and production of k*achri* at large scale in hot arid eco-system.
2. To analyze the factors which restrain the adoption and production of *Kachri* at large scale in hot arid eco-system.

Materials and methods

The present study was conducted in Bikaner district of western Rajasthan. The district consist of eight revenue Tehsils. Out of these, two Tehsils namely, Bikaner and Lunkarnsar Tehsils were selected randomly for the study. With the help of secondary data available at each selected Tehsil's headquarter, a list of the total number of villages falling under these two Tehsils were prepared separately during the study. On the basis of population size, all villages of these Tehsils were categorised in three groups i.e. small, medium and big villages. Further, four villages were selected randomly from each above

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categories of villages. Thus, a total of 24 villages were selected from concerned two Tehsils for the study. All *kachri* growing farmers of these selected villages were listed one by one on the occasion study and divided in three groups i.e. small, medium and big farmers (*kachri* growers). Amongst the selected 24 villages, two small farmers, two medium small farmers and two big farmers were selected randomly from each group of above farmers. In this way, 6 respondents (*kachri* growers) were chosen from each category of so selected villages by using random method of sampling. Thus, a total of 144 respondents (*kachri* growers) were selected amongst the above groups of the farmers of 24 villages of the selected two Tehsils. Further, the selected *kachri* growers were personally contacted and interviewed one by one to assess factors which inspire them to adopt and grow *kachri* crop at large scale on their fields. Simultaneously, the factors which restrain adoption and production of *kachri* crop at large scale were also collected. To find out the rank order of different inspirational factors of the farmers, each factor was assigned with specific score as per response of individual farmer as was interviewed. The first factors of their inspiration was assigned with highest score and last one assigned with lowest score under different groups of the factors. For example, under group of 'economic inspirational factors' there were 8 inspirational factors in total. Therefore, the first ranked inspirational factor was assigned with score 8 (highest) and the inspirational factor which was ranked by farmer as 8th economic inspirational factor was assigned with score 1 (lowest). The final rankings of these factors were work out on the basis of total score obtained by each such factor. To measure the factors which restrain the adoption and production of *kachri* at large scale, a five-point continuum viz:, strongly disagree, disagree, undecided, agree, strongly agree, was developed and used. The score 1,2,3,4, and 5 was allotted in response of strongly disagree, disagree, undecided, agree, strongly agree, respectively. The all responses of the farmers during the survey were recorded on semi-structured interview schedule. The statistical tools like frequencies, scoring, ranking, percentage, etc. were used for analysis and drawing inferences of the study.

Results and Discussion

During the survey, there were observed several inspirational factors which encourage the farmers to grow *kachri* crop extensively. These inspirational factors were grouped as economic, production and technological, socio-religious inspirational factors and inspirational factors related to storage and marketing, agro-ecological aspects, etc. The major such motivational factors as reported by the farmers (*kachri* growers) during the survey are described here.

1. Economical inspirational factors

The data in Table 1, reveals that amongst the economical inspirational factors "substantial income from fresh fruits of *kachri*, substantial income from dried (dehydrated) *kachri, l*ow cultivation cost of cultivation, minimum loss due to the attack of insects and diseases" were the major economical inspirational factors behind the production of *kachri* at large and commercial level which were ranked as first, second, third and fourth important economical inspirational factors with score 822, 777, 765, and 711, respectively. The other economical inspirational factors which leads to large production of *kachri* crop in hot arid environment of Bikaner district were, low cost of picking and handling, enough income from seeds,

Table 1. Economical motivational factors

S.No	Inspirational factors	Score (PMS* =1152)	Rank
1	Substantial income from fresh fruits of *kachri*	822	1
2	Substantial income from dried (dehydrated) *kachri*	777	2
3	Low cost of cultivation	765	3
4	Low cost of picking and handling	612	5
5	Minimum loss due to the attack of insects and diseases	711	4
6	Enough income from seeds	555	6
7	Availability of plenty of land resource.	432	7
8	Availability of surplus family labour / manpower.	323	8

*PMS = Possible Maximum Scores

2. Production and technological inspirational factors

Table 2, reveals that the major production and technological inspirational factors which encourage/motivate the farmers for commercial production of *kachri* in hot arid ecosystem were, " very low water requirement of the crop, high seed germination capacity of the crop, accessibility of drought hardy local varieties, high productivity of the crop, minimal land preparation requirement, and comparatively short duration crops" which were ranked as first, second, third, fourth, fifth and sixth important production and technological inspirational factors which were scored as 1098, 1047, 1007, 964, 888 and 787, respectively. Singh and Singh (2005) reported that the farmers grow vegetables because the vegetables provide regular income to fulfil the needs of food and fodder, create regular employment for family labour and utilize agro- resources efficiently. Swarup *et al.* (1987) also reported that compelling reasons of growing horticultural crops by farmers other than nutritional advantages were favourable climatic features, higher income from per unit area from horticultural crops profitability and employment generation. The other production and technological

inspirational factors behind production of *kachri* on large and commercial scale *kachri* in hot arid ecosystem were 'easiness in sowing and harvesting of the crop, minimal requirement of intercultural operation and agro-chemicals and advancement in production technologies of the *kachri* crop. There is well known fact that the water scarcity and occurrence of frequent drought are the major problem of hot arid regions. In such conditions, the *kachri* crop can be grown with limited irrigation water/rainfall. Its seed germination capacity is very high and it is highly drought resistant crop, it requires minimum land preparation. It is very short duration crop and does not require any special management. Hence, the farmers of Western Rajasthan like Bikaner district produce *kachri* at commercial scale.

Table 2. Production and technological inspirational factors.

S. No.	Inspirational factors	Score (PMS* 1440)	Rank
1	High productivity of the crop	964	4
2	Easiness in sowing & harvesting	703	7
3	Minimal land preparation requirement	888	5
4	Minimal requirement of intercultural operation	606	8
5	Minimal agro-chemicals/pesticides requirement of the crop.	511	9
6	Accessibility of drought hardy local varieties	1007	3
7	Comparatively short duration crop	787	6
8	Very low water requirement of the crop.	1098	1
9	High seed germination capacity	1047	2
10	Advancement in productional technologies	333	10

*PMS = Possible Maximum Scores

3. Socio-psychological inspirational factors

There were several socio-psychological inspirational factors (Table-3) which inspired the farmers of arid regions to produce *kachri* on large scale in their fields. The major socio-psychological inspirational factors as reported by the farmers were, " the vegetables of mature *kachri* fruits is most favorite, *kachri* vegetable has a special test and flavour, its preserved items are most like and acceptable in the society, has high value of nutrition and digestion capacity, preparation of vegetable of *kachri* is very easy and economic, *kachri* fruits are used as in worshiping " which were ranked as 1st, 2nd, 3rd, 4th, 5th and 6th with scores1133, 1112, 1091, 889, 788 and 688, respectively. Maini (1997) also reported that the socio-economic reasons of growing common vegetables were to make value added products. They cited that people in dessert areas of Rajasthan grow vegetables (beans) and fruits like cluster bean, *kachri*, *ker*, *khejri*, *lasoda* etc. to make their value added products and as the main source of vegetables during chronic shortage of common vegetables. Thus, they were inspired to grow these vegetables to meet out their vegetable needs in adverse climatic conditions.

Moreover, a farmer who produces batter higher quantity of *kachri* fruits on his field was viewed as a person having high social status.

Table 3. Socio-psychological inspirational factors

S.No.	Inspirational factors	Score (PMS* =1296)	Rank
1	The vegetables of mature *kachri* fruits is most favorite vegetable of the region.	1133	1
2	*k achri* vegetable has a special test and flavour	1112	2
3	The preparation of vegetable of *kachri* is very easy and economic.	788	5
4	Has high value of nutrition and digestion capacity	889	4
5	Batter production of *kachri* fruit is viewed as high social status	323	8
6	Its preserved items are most like and acceptable in the society.	1091	3
7	Preparation of soft drinks from *kachri* juice	563	7
8	*kachri* fruits are used as in worshiping	688	6
9	*kachri* has esthetic value also.	319	9

*PMS = Possible Maximum Scores.

4. Inspirational factors related to storage and marketing aspects.

Table 4, reveals that the important inspirational factors related to storage and marketing aspects of k*achri* were," high demand of *kachri* fruits in localities/ local markets/villages, high demand of value added products of *kachri* in the markets, very good storage life of the k*achri* fruit, k*achri* fruits are within reach of purchasing capacity of common people, easy in packing, loading-transportation-unloading" which were ranked as 1st, 2nd, 3rd,

4th, and 5th with scores 711, 635, 567, 486 and 412, respectively. During the survey, it was also reported by the farmers that the *kachri* crop was grown not only due to its drought hardiness, high consumption, and high productivity but it can be stored and sold up to a desirable period at different consumption centers / local markets without degradation in its quality and weight. Every body like to eat *kachri* fruits and poorest amongst poor also want to purchase it. Moreover, the k*achri products* have high nutritional value and multipurpose use. Hence, its demand is very high in localities/local markets that is why farmers grow *kachri* crop at large scale to earn money. It has been revealed that horticultural crop production can be promoted/ increased by developing effective and cheap pest control measures, irrigation, storage facilities, efficient transportation facilities, processing, marketing system, etc.

Table 4. Inspirational factors related to storage and marketing aspects.

S. No	Inspirational factors	Score (PMS* = 864)	Rank
1	High demand of *Kachri* fruits in localities/ local markets/villages.	711	1
2	Easy in packing, loading-transportation-unloading	412	5
3	*Kachri* fruits are within reach of purchasing capacity of common people	486	4
4	Very good storage life of the *Kachri* fruit.	567	3
5	High demand of value added products of *Kachri* in the markets	635	2

*PMS = Possible Maximum Scores .

5. Agro-ecological inspirational factors

The farmers disclosed several agro- ecological inspirational factors behind production of *kachri* on commercial scale in Bikaner district (Table 6). They reported that the *kachri* crop has some special agro-ecological beneficial peculiarities which make suitable this crop to grow at large scale in hot arid conditions. The major agro - ecological inspirational factors which motivate the farmers to grow *kachri* crop extensively were " *kachri* is very important component of traditional mixed cropping system of arid regions., *kachri* is most suited crop in hot arid ecosystem, it has high growth capacity even during low rainfall/drought conditions, *kachri* crop helps in soil and moisture conservation and it has high water absorbing capacity ", which were ranked as 1st, 2nd, 3rd, 4th and 5th important agro - ecological inspirational factors with scores 883, 824, 766, 678, and 587, respectively.

The other agro - ecological inspirational factors encouraging the farmers to grow *kachri* crop at large scale on their fields were, "*kachri* crop adds organic matter into the soil and increases soil fertility, it generates suitable micro-climate in the crop field and help in productivity of other fellow crop or succeeding crops." Samadia (2006) also stated that arid region of Rajasthan were best suitable for production of some cucurbits like water melon, (*mateera*), musk melon, snap melon, *kachari*, round melon, etc. during both summer and kharif season of the year. He mentioned that the best quality of these cucurbits are produced in these regions due to high temperature, low humidity and plenty of sunshine at the time of fruit maturity and ripening. The mixed cropping system is prominent cropping system of arid regions in which cucurbits are considered as major components of the above cropping system.

Table 5. Agro - ecological inspirational factors

S. No.	Inspirational factors	Score (PMS* =1008)	Rank
1	*Kachri* is most suited crop of hot arid ecosystem	824	2
2	It has high growth capacity even during low rainfall/drought conditions	766	3
3	*Kachri* crop helps in soil and soil moisture conservation	678	4
4	*Kachri* is a very important component of traditional mixed cropping system of the arid regions	883	1
5	It adds organic matter into the soil and increases soil fertility	514	6
6	It generates suitable micro-climate in crop fields	398	7
7	It has high water absorbing capacity .	587	5

PMS = Possible Maximum scores.

7. The factors which restrain the adoption and production of k*achri* at large scale in hot arid eco-system.

It is a well-known fact that the *kachri* crop is a tremendous crop grown in hot arid ecosystem of western Rajasthan. It is grown at large scale in western Rajasthan. However, the farmers face various constraints in successful production of k*achri* at large and commercial scale. During the survey of present study, the farmers reported various factors (Table 6) which restrain the adoption and production of *kachri* at large scale on their fields. The major such restraining factors as reported by the farmers were; scarcity of water, very low and erratic rainfall and occurrence of drought very frequently, lack of viable

scheme and support system for *kachri* growers, no standardized technique is available for value addition *kachri*, very deep and salty ground water, inadequate supply of electricity, poor marketing system and market intelligence and lack of knowledge and awareness amongst the farmer about improved technologies of *kachri* cultivation," which were considered as 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th important factors which restrain the adoption and production of *Kachri crop* at large scale in hot arid ecosystem of Bikaner district. Singh *et.al* (2005) reported that there were several socio-economic, production and marketing constraints in vegetable production in Almora and Nainital districts of UttaraKhand . Singh (1997) also revealed that lack of adequate hybrid seed, lack of full package of practices, absence of practical training facilities and adequate incentives, lack of publicity and frontline demonstrations of the improved technologies etc. hindered the adoption of improved technologies /hybrid.

Table 6. Major factors which restrain the adoption and production of *kachri* at large scale

S.No.	Restraining factors	Score (PMS*=720)	Rank
1	Scarcity of water	699	1
2	Very deep and salty ground water	539	5
3	Very low and erratic rainfall and occurrence of drought very frequently	692	2
4	No standardized technique is available for value addition of k*achri* fruits.	565	4
5	Per hectare income/return from *kachri* crop is poor	321	11
6	Lack of improved production technologies	377	9
7	Poor extension system	344	10
8	Lack of viable schemes and support system for *kachri* growers	606	3
9	Poor transportation, communication and information network.	256	12
10	Inadequate supply of electricity	511	6
11	Lack of knowledge an d awareness amongst the farmers about improved technologies of *kachri* cultivation.	393	8
12	Poor marketing system and market intelligence	444	7

*PMS= Possible maximum score.

The other factors which restrain the adoption and production of *kachri crop* at large scale in arid ecosystem of Bikaner district of western Rajasthan were, lack of improved production technologies of *kachri* cultivation, poor extension system, per hectare income/return from *kachri* crop is poor, poor transportation-communication and information net work, etc. The farmers wanted to grow *kachri* crop at large scale not only during kharif season but in summer season also. However, the above factors create the problem in large production of *kachri* in hot arid regions of the western Rajasthan. Anon. (2002) also reported that low income, high cost of input, lack of farmers training, lack of location specific technologies, poor and erratic rainfall, water scarcity, occurrence of frequent drought, safety ground water etc. are the major constraints which hinder the horticultural development in arid region.

The present study revealed that there were several economical, production and technological, socio-psychological, storage and marketing, and agro-ecological inspirational factors which encourage the farmers for adoption and production of *kachri* crop at large scale in hot arid ecosystem of western Rajasthan. These factors should keep in mind while preparing any research and developmental programme for large scale production of *kachri* crop in such hot arid regions. However, the farmers also several factors which restrain the adoption and production of *kachri crop on* large scale in hot arid parts of western Rajasthan. Therefore, the suitable strategies and action plan should be prepared to combat these adverse so that farmers can able to produce *kachri* at large scale to sustain their livelihood in such harsh climatic conditions.

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