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Short communication

An evaluation ber based farming system in hot arid eco-system of western Rajasthan

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The arid regions cover about 12% area of the total geographical area of the country. The hot arid regions spread over the states of Rajasthan, Gujarat, Andhra Pradesh, Punjab, Haryana, Karnataka and Maharashtra which are characterized by hostile agro-climate and fragile eco-system (Anon., 1998-99). Despite the various bio-physical constraints, the hot arid areas of western Rajasthan like Bikaner district offers very good opportunities for ber based farming system including rearing of cow, buffalo, sheep, goats and camels with ber production. Monocropping is a very risky profession in hot arid regions of western Rajasthan due to frequent occurrence of drought, which results in famine. Therefore, people of this region adopt subsistence and mixed farming system i.e. crop production with livestock rearing. It has been observed that the ber production with livestock rearing is a very dominant emerging farming system in western Rajasthan. However, the authentic information about recent development in ber based farming system practiced in arid eco-system of western Rajasthan are not available. Such information may be of paramount importance for strategic plan formulation for further encouragement of ber based farming system and other alike programmes for the farmer's welfare in arid regions of the country.

Thus, keeping the above facts in mind, the present study was conducted in Bikaner district of western Rajasthan with the objective "To evaluate the ber based farming system and related practices followed by the farmers" in arid eco-system.

The present study was conducted in Bikaner district of western Rajasthan to evaluate the ber based farming system practiced by the farmers in arid environment. The district consists of eight Tehsils, out of these, two Tehsils namely: Lunkarnsar and Dungargarh Tehsils were selected purposively (as per need of the Project). With the help of secondary data available at headquarter of each Tehsil, the lists of all the villages falling under these Tehsils were prepared separately and these villages were grouped into two categories viz., small and large villages. Further, five villages were selected randomly from each categories (i.e. small and large village) of villages of the selected Tehsils. Thus, a total of 20 villages (five small and five large villages from each Tehsils) were selected for the study. The researcher himself went to these villages one by one and discussed with villagers about the population of ber growers. With the help of key persons of the selected villages, a comprehensive list of ber growers in each village was prepared. Further, six ber growers were selected randomly from each small and large village so selected for the study in two Tehsils. Thus, a total of 120 ber growers were selected from two Tehsils of Bikaner district for the purpose. The selected ber growers were personally contacted and interviewed by the researchers and responsive data/information were recorded on a semi-structured interview schedule. The data so collected were coded, decoded, processed and arranged in tabular forms by using statistical tools like frequencies, numbering, percentage, etc. to draw inferences and conclusion of the study.

The results of the present study revealed that over all 22.28 and 17.72 per cent farmers grew ber (both country type and improved varieties) in irrigated and rainfed conditions in surveying area of the district. The area covered under ber orchards by different farmers varied between 0.2 – 2.2 ha. Mishra *et. al.* (2003) also reported more or less similar finding in their study.

Perusal of data presented in Table-1, reveals that in *kharif* season (irrigated conditions) 54.28 per cent ber growers grew cluster bean / mateera / snapmelon / kachari / roundmelon / ridge gourd/ Indian aloe, groundnut etc. as an inter-crops in ber orchards on an area ranging from 0.3-0.8 ha. While in rainfed conditions (*Kharif*) mateera, snapmelon, kachari, round melons, pearl millet / seasemum / moth bean / cluster bean, etc. were grown by them in mixed form and different combinations as intercrop in ber orchards. Such kind of cropping system was the most prominent system of cropping in arid environment of the Bikaner district, which is practiced by majority of the ber growers during Kharif season.

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Table 1: Intercrops grown in ber orchards

Season	Condition	Intercrops	Area (ha)	Percentage of ber growers who grew intercrops.
Kharif	Irrigated	Brinjal, chilli (*Capsicum annum*), Cluster bean (*Cymopsis teragonoloba*), mateera (*Citrullus lanatus*), snapmelon (*Cucumis melo var. momordica*), kachari (*Cucumis callasus*), round melon (*Citrullus vulgaris*), ridge gourd (*Luffa acutangula*), Indian aloe (*Aloe barbadensis*), ground nut in ber, orchards	0.3-0.8	54.28
	Rainfed	Mateera, snapmelon, kachari, round melon, pearl millet, seasemum, moth bean and cluster bean in various combinations	0.5– 1.9	77.82 (depending on rainfall)
		khejri (*Prosopis cineraria*)	0.8 - 39 plant/ ha.	72.25
Rabi	Irrigated	Brinjal, bottle gourd, mustard (leaves), spinach, coriander, carrot, radish, pea, green onion, cauliflower, cabbage, chilli, fenugreek, mustard, wheat, gram, etc. in ber orchards	0.1-0.7	41.50
Zaid (Summer)	Irrigated	Mateera, snapmelon, kachari, bottle gourd, ridge gourd, round melon, etc. in ber orchards	0.1-0.6	36.33

Under rainfed condition, plantation of perennial khejri (*Prosopis cineraria*) plant was a very important source of vegetable in arid regions. The *Prosopis* tree produces the pods (sangari) for vegetable and loong (leaves) as a nutritious fodder for the farm animals. During the study 08 – 39 perennial plants of *Prosopis* (per ha) in ber orchards were observed which were major source of traditional vegetable (*sangari*) and fodder for farm animals. These khejri plants were either grow naturally or grown by the farmers. Similar information has been reported in vision-2020 (Anon., 1997).

During *rabi* season under irrigated conditions 41.50 per cent ber grower grew brinjal, cauliflower/cabbage, spinach, fenugreek, coriander (leaves), carrot, radish, pea, green onion, mustard, wheat, gram, etc. as an inter-crops in ber orchards on a small scale (0.1-0.7 ha). Some of the farmers having irrigation facilities grew few vegetables in ber orchards during Zaid (Summer) season also. It was found that out of total ber growers, 36.33 per cent of them grew mateera, snapmelon/ kachari, bottle gourds/ ridge gourds/ round melon / *kakadi*, brinjal, cluster bean (veg.), okra, tomato, etc. as inter - crops during summer season in ber orchards in an area ranging from 0.1-0.6 ha.

It was also observed that more than 70% of the ber growers of locale of the study grew country type varieties of the above-mentioned vegetables. However, a few ber growers grew hybrid/improved varieties of mateera (AHW-19, AHW-65), snapmelon (AHS-10, AHS-82) and kachari (AHK-119, AHK-200) and other vegetables in their ber orchards.

Ber-cum-livestock production system

The results of the present study further revealed that the ber growers of locale study area of Bikaner district grew not only ber but also reared some economic farm animal with ber production as a subsidiary enterprise. Since, in arid areas like Bikaner district, ber production is a risky enterprise and uncertain due to shortage of water and occurrence of frequent droughts and famines. Under such conditions the majority of the ber growers rear farm animals (livestock) as another important source of their income and employment.

The data presented in Table 2, revealed that cow, buffalo, sheep, goats and camels were the major farm animals, which were reared by 42.25, 21.50, 28.75,32.20 and 39.50 per cent ber growers, respectively. Similar type of findings had also been reported by Singh, (1999).

The major breeds of cow reared by the ber growers were, country types, Rathi, Tharparker, Jersey, Holstein Frision and cross breeds. The cows were reared 01 - 14 in numbers by 42.25 % ber growers mainly for the production of milk, FYM and draft purpose. Amongst the buffalo breeds, country type, Murrah, Surti, Jaffarabadi etc. were the major breeds which were reared by 21.50 % ber growers

Table 2. Livestock/ farm animals reared by ber growers

Major farm animal reared	Total population of farm animals in the district (2003)*	Major breeds of farm animals reared by ber growers	Percentage of ber growers rearing animals	Herd size of animals per ber grower	Major purposes of rearing farm animals
Cow	608597	Country type, Rathi, Thar parker, Jersey, Holstein Frisien, cross breeds etc.	42.25	01-14	Milk and Draft, FYM
Buffalo	132732	Country type, Murrah, Surti, Jaffarabadi, etc.	21.50	01-05	Milk & FYM
Sheep	928832	Chokla, Magra, Poogal, Sonadi, Marwari, Nali, cross breeds, etc.	28.75	10 - 32	Wool, Meat, Milk, FYM
Goat	686509	Marwari, Jakharana, Lohi, Cross breeds	32.20	05 - 22	Milk, Meat, FYM, Hairs
Camel	61861	Bikaneri, Jaisalmeri, cross breed transportation, wool.	39.50	01 - 03	Draft,

Dainik Bhaskar, News Paper, June 03, 2004 (Bikaner)

having herd size from 01-05 for milk and FYM production. The Chokla, Magra, Poogal, Sonadi, Marwari , Nali and cross breeds were the major breeds of Sheep, which were reared by 28.75 % of the ber growers having herd size 10 - 32 for wool, meat, FYM and milk production. The ber growers (32.20%) reared some goats also for milk, meat, FYM and hair production having herd size from 05 – 22. The major breeds of goat reared by ber growers were Marwari, Jakharana, Lohi, cross breeds, etc. The camels were reared by 39.25 per cent ber growers ranging 01-03 in number for draft in different agricultural operations. The cross breeds, Bikaneri, Jaisalmeri, etc. were the major camel breeds, which were reared by the ber growers. These findings are on the line of findings as reported by Sardana *et. al.* (2003).

It was concluded that more than one third population of the farmers of Bikaner district (Rajasthan) grew country type and improved varieties of ber. The majority of ber growers grew various crops like mateera, snapmelon, kachari, brinjal, bottle gourd, ridge gourd, round melon, Indian aloe, spinach, carrot, radish, green onion, fenugreek, cauliflower, chilli, cluster bean, pearimillet, cowpea, groundnut , mustard, gram, wheat, coriander, cumin, etc. as inter – crops in ber orchards during different seasons of the year. It was also observed that most of the ber growers reared various farm animals for different purposes. The major farm animals reared by ber growers were cows, buffaloes, sheep, goats and camels. These animals were reared for various purposes viz, milk, wool, meat, FYM, hair, skin production, draft purposes, for extra income and employment generation. Therefore, ber growers adopted mixed farming system to reduce risk and uncertainty in their farming system to sustain their livelihood especially during drought and famine conditions.

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