Original Research Article

Knowledge of Farmers about Improved Fodder Production Practices in Rajasthan State of India

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The present study was conducted in Rajasthan. The investigation concerned with semi-arid zone of Rajasthan, which is the highest livestock and bovine population in zone, 6986.2 and 3287.9 thousands; respectively. Milk production and productivity depend on the quality and quantity of feed & fodder. Feed and fodder constitute about 60-70 per cent cost of milk production. A portion of its fodder requirement is also met by lopping and cutting of trees from the agricultural fields and homestead areas. It was estimated that major consumption of crop residue and green fodder varies in different seasons. This feed resource, which consists mainly of grasses, legumes and cereal crop residues vary widely and are spread across the major agro- ecological zones of the Rajasthan. Hence, an investigation entitled "A Comprehensive Study on Fodder Production and Its Utilization Pattern in Semi-Arid Zone of Rajasthan" was conducted on proportionate randomly selected 240 dairy farmers belonging to different land holding categories and growing at least two fodder crops in a cropping year were taken as respondents of Dausa and Tonk districts in Semi-arid zone of Rajasthan. The knowledge showed a highly significant positive relationship with land holding, herd size, milk production and extension contact of improved fodder cultivation practices.

Introduction

Dairying is an integral part of Indian agriculture and it holds a significant place in Indian economy. At the household level; dairying plays an important role in determining the economic condition of 70 million farm families (NSIC, 2013). The dairy enterprise provides insurance against crop failure and contributes directly towards increasing the crop production by making availability of draught power, organic manure and cash income on a regular and day-to-day basis. In addition, dairying is crucial in providing assured employment and nutrition to farm family. In the mixed farming systems of India; milk production is predominantly the domain of small holders.

The early history of fodder growing and utilization pattern is lost in the unwritten pages of time, pre-historic man had no need for such crops, since he supported himself as well as his family-members by picking fruit,

digging roots, fishing, hunting, etc. it was until he started taming animals that necessitated fodder cultivation. The animals which inhabited the forests and field were numerous and of diverse types. Some preyed upon other animals, but mostly they were herbivorous. They probably fed on grasses, legumes, trees, bush leaves and other green and succulent plants. The first animals to be domesticated were those which still inhabit in the field of farmers, for example, dogs, horses, cattle, buffaloes, sheep, poultry and various others. As mankind increases in numbers and tamed more and more animals, it become necessary to consider how could be fed the essential for maintenance, growth and reproduction. Since these animals were mostly herbivorous type, the primary need was for grasses and fodder crops (Meena, 1997).

Fodder plays a critical role in the crop, livestock, and manure and soil nutrient cycle in traditional farms in the Rajasthan. Collection of fodder is the first step that turns the wheel of the agricultural economy of the village community. This complex interrelationship between forests, grasslands, livestock and crops in farming systems has contributed to the sustainability of agriculture for generations.

In feeding, fodder is the major constituent (2/3) of animal feed. It is essential to increase fodder production by increasing area under cultivation to 12 per cent of the total cultivable land and use of high yielding varieties of fodder crops. Farmers should also be main tend to conservation and preservation of fodder which can be used during the scarcity period to maintain the milk production. Also, there is a need to carry out research for producing quality fodder from dry land (Kalam, 2010).

Unfortunately, dairy farmers of our country are still not well aware of importance of cultivating fodder crops which provides better nutrition to the animals in maintenance of their health and production. Even the farmers having adequate land holding that can be utilized for cultivating fodder crops, besides the cultivation of food grain and vegetables crops, do not seem to be enthusiastic/inclined towards cultivation of fodder crops. This situation is not good for dairy farmers, who have to depend solely on their dairy animals for their own livelihood because unless and until the dairy animals are fed with green fodder, the milk yield as well as productivity per animal will not increase substantially. However, of late, due to the efforts of governmental programmes' as well as other concerned agencies, the dairy farmers slowly and slowly are being motivated to think in this direction. Hopefully, in the long run this can contribute a lot towards improving the milk production of our country.

Fodder crisis in the Rajasthan has been debated long back as it is seen a widening gap between increasing demand and decreasing supply due to diminishing resources. Thus, there is need to devise the way & evolve strategies and solutions to prevent large scale resource depletion which, leads negative effects on the process aimed at achieving sustainable development. A portion of its fodder requirement is also met by lopping and cutting of trees from the agricultural fields and homestead areas. It was estimated that major consumption of crop residue and green fodder varies in different seasons. This feed resource, which consists mainly of grasses, legumes and cereal crop residues vary widely and are spread across the major agro-ecological zones of the Rajasthan. The role of these forage and fodder crops in farming systems of Rajasthan is particularly reflected in their contribution to soil fertility and the sustenance of the livestock subsector of the nation's economy. Unfortunately, extensive areas of the grazing lands are composed of indigenous species, which are of low yield

and quality. Hence, there is need to develop or adopt strategies, or technologies that will assist species to cope with and even overcome most of the factors which mitigate against high productivity.

Thanks to green revolution, food production of our country has increased substantially. This has been made possible as a result of break-through in the yield of wheat and rice per unit area due to adoption of high yielding varieties. However, there is no proportional increase in straw yield, as these varieties have higher 'Harvest Index'. Traditional crops, such as small millets and maize are being replaced by high yielding varieties of rice and wheat whose residues are having lower nutritive value for animal feeding. Lodging resistance, a highly desirable character for high yield of grain is obtained due to more silicon content in crop residues which reduces the feeding quality of straw. Hence, more green fodder is required to meet the nutritional requirements of animals. Cultivated fodder crops, grasses and shrubs can grow in arid and semi-arid areas of the Rajasthan and provide invaluable feed to livestock during long and dry summer period and mid-winter, when herbaceous plants are dormant.

Materials and Methods

The present study was purposively conducted in Semi-arid Zone of Rajasthan. Out of the four districts of this region, two districts namely Dausa and Tonk were selected purposively considering livestock minimum and maximum density. Two tehsils were selected randomly from each identified district and from each selected tehsil, three villages were selected randomly for the present study. Twenty respondents from each selected village were selected by proportionate random sampling methods. Thus, 240 dairy farmers constituted the sample size for this study.

Results and Discussion

Knowledge level of farmers on Improved Production Practices of Kharif fodder crops

The frequency distribution of different categories of farmers with respect to their level of knowledge

Production of sorghum

It is evident from Table-1 that in case of Sorghum crop production, majority of the farmers (64.17%) had medium level of knowledge, followed by 18.33 and 17.50 per cent of them had high and low levels of knowledge, respectively. The mean score of knowledge for production practice was 29.65.Thus; it indicates that maximum percentage of the respondents belonged to the medium level of knowledge category about improved fodder practices of Sorghum. These findings have been supported by the findings of Suman *et al.,* (2002).

Production of Bajra

The findings presented in Table-1revealed that in case of Bajra crop production, majority of the farmers (70.00%) had the medium level of knowledge regarding improved practices of Bajra crop as compared to 16.67 and 13.33 per cent of them possessed high and low levels of knowledge; respectively. The mean score of knowledge was 27.73.

It could be concluded that the majority of the farmers belonged to medium level of knowledge category about improved fodder practices of Bajra. We may say that both the fodder crops are rainfed crops which were properly utilized for green fodder in Kharif season. These findings have been supported by the findings of Singh (1993) and Dass (1996).

Extent of knowledge on improved fodder production practices of Kharif crops

To ascertain the extent of knowledge of the respondents regarding different improved fodder production practices, twelve important recommended practices *i.e*., land preparation, seeds, sowing methods, varieties, seed rate, sowing time, farm yard manure use, nitrogen fertilizer use, phosphorus fertilizer use, irrigation, harvesting and fodder yield were selected; and knowledge score on each practices was worked out.

The results presented in Table-2 indicates that the Sorghum growers were having 69.00,67.25,66.50,66.25,65.00,62.00,60.75,60.50,58.75,58.25,57.75 and 49.25 per cent of knowledge about irrigation, seed rate, sowing time, harvesting, fodder yield, varieties, nitrogen fertilizer use, farm yard manure use, phosphorus fertilizer use, seed, land preparation and sowing methods, respectively. The farmers had 61.78 per cent of overall knowledge on Sorghum fodder crop about the improved fodder production practices.

It can be concluded that farmers of the research area had more knowledge about the irrigation practice as compared to the other practices further they were having least knowledge on sowing method. More knowledge about their irrigation practice in case of Sorghum may be attributed to the knowledge of farmers about harmful effect of Sorghum fodder grown under moisture stress condition on health of animal due to presence of HCN in the plant produce under such conditions. Moreover, least knowledge about the sowing method shows that farmers did not care much about the crop as it is not being grown for grain purpose. Other reasons may be the lack of training on fodder production, inadequate media coverage on production and lack of availability of seed in time.

The Bajra crop growers were having 66.25,63.00, 61.00, 61.00, 59.50,59.25, 59.25, 58.00,48.75and 48.25 per cent of knowledge on sowing time, fodder yield, seed rate, nitrogen fertilizer use, harvesting, land preparation, seeds, varieties, phosphorus fertilizer use and sowing methods; respectively. Overall knowledge about Bajra fodder crop was observed to be the 57.79 per cent. It can be concluded that farmers of the study area had more knowledge on the sowing time practice as compared to the other practices further; they were having least of knowledge on sowing methods. More knowledge about the sowing time of Bajra might be due to that the study area come under semi arid zone/rain fed area, therefore, crop raising is dependent on rainfall thereby, they were more conscious about the timing of sowing to achieve more yield. Moreover, least knowledge about the sowing method shows that farmers were not aware about the right method of sowing of fodder crops.

On the basis of overall knowledge of farmers on raising Kharif season fodder crops it can be concluded that farmers had more knowledge about Sorghum crop. It may be due to the farmers were growing Sorghum crop mostly for green fodder purpose; therefore they were paying more focus on it. The respondents were growing Bajra more for grain production as compared to fodder production. The extent of knowledge about Bajra fodder crop production was found to be 57.79 per cent.

A cursory look of Table-2 indicated that the knowledge of farmers about the production of fodder in Kharif season was found to be the 66.37, 64.37, 64.00, 62.87, 61.50, 60.12, 59.37, 58.88, 58.63, 53.75 and 48.75 per cent with respect to the sowing time, seed rate, fodder yield, harvesting, nitrogen fertilizer use, irrigation, varieties, farm yard manure use, seed, land preparation, phosphorus

fertilizer use and sowing method; respectively.

It can be concluded that farmers of the research area had more knowledge about the sowing time practice as compared to the other practices. Further, they were having less knowledge on sowing method however; they were having highest score of knowledge about right time of sowing. It is concluded that higher percentage obtained on sowing time seems to be logical and justified because farmers have learnt from their ancestor and also it is a non monetary input. Poor knowledge on sowing method is the resultant of being more technical and complex in nature. The extension agencies should be geared up to educate the farmers through different extension methods and techniques such as trainings, demonstrations, field days, exhibition, print media and audio-visual aids, etc. Further fodder component must be with animal husbandry department for effective extension or farmers' participatory technology.

Distribution of farmers according to their knowledge about Improved Production Practices of Rabi season fodder crops

The frequency distribution of different categories of farmers with respect to their level of knowledge is presented below.

Production of Lucerne (*Medicago Sativa*)

It is evident from Table-3 that in case of Lucerne crop production, majority of the farmers (74.17%) had medium level of knowledge, followed by 15.00 and 10.83 per cent of them had high level and low level of knowledge; respectively. The mean score of knowledge for production practices was 28.33.Thus; it indicates that maximum percentage of the respondents belonged to medium level of knowledge category about

improved fodder production practices of Lucerne.

Production of Kasni (*Cichorium Intybus*)

The results presented in above table indicate that in case of Kasni crop, majority of the farmers (66.67%) had medium level of knowledge followed by 17.50 and15.83 per cent farmers had low and high level of knowledge, respectively. The mean score of knowledge for production practice was 26.60. It could be concluded that majority of dairy farmers were having medium level of knowledge about improved fodder practices of Kasni production.

Extent of knowledge on improved fodder production practices of Rabi fodder crops

Results in the Table-4 indicate that the Lucerne growers were having 65.00, 63.50,62.75,61.50, 61.25,60.00,58.75, 57.00,55.75, 54.00 and50.75 per cent of knowledge about harvesting, fodder yield, irrigation, sowing time, land preparation, nitrogenous fertilizer use, phosphatic fertilizer use, seed rate, farm yard manure use, seed, varieties, sowing methods aspects of improved fodder production. It can be concluded that the farmers were having more knowledge on harvesting of Lucerne as compared to other practices. It may be due to the reduction in the fodder quality if harvested at inappropriate stages thereby, farmers were giving more emphasis on this aspect of fodder cultivation.

The farmers' overall knowledge about the production of the Lucerne was 58.82 per cent which implies that they were having about 42.00 per cent of knowledge gap that needs to be abridged for improving the productivity of the crop. Though agronomically Kasni is considered a weed, however, in Rajasthan farmers were used to grow it as a fodder crop.

Kasni growers were having 64.50, 62.00,60.00, 57.50,57.00, 56.75, 55.25, 54.00, 53.75, 50.255, 47.50 and 46.25 per cent of knowledge about irrigation, fodder yield, sowing time, harvesting, seed rate, phosphatic fertilizer use, farm yard manure use, land preparation, nitrogenous fertilizer use, seed, varieties and sowing methods of fodder production aspects; respectively. It could be concluded that farmers were having more knowledge about irrigation as the yield of Kasni is directly dependent on moisture availability in the field being it is a succulent crop. Moreover, is susceptible to water logging condition also as compared to the other crops. Further, it was observed that the farmers were having least knowledge on sowing methods and it may be because of this crop is solely grown for fodder purpose thereby farmers were not paying much alteration about sowing of crop.

The overall knowledge of farmers about the production of Kasni was found to be 58.26 per cent. It means that knowledge gap was found to be 42.00 per cent there as far as production practices is concerned. This might be due to that it is a newer introduction as a fodder crop and complete package of practices for varieties agro climatic zones were not available.

A critical examination of Table-4 indicates that the extent of knowledge of farmers in different aspects of fodder production about the Rabi season fodder crops were found to be the 63.25, 62.75, 61.25, 60.75, 57.75, 57.62, 57.00, 56.87, 55.50, 53.00, 50.75 and 48.50 per cent about the irrigation, fodder yield, harvesting, sowing time, phosphatic fertilizer use, land preparation, seed rate, nitrogenous fertilizer use, farm yard manure use, seed, varieties and sowing methods, respectively. It is concluded that the farmers were having more knowledge on irrigation practices and least about the sowing methods.

It might be due to the farmers are facing water scarcity as Rabi fodder crops require more irrigation and in Rajasthan there is scarcity of water. Therefore farmers were found to be managing available water resources to raise the crops. In the study locale, maximum area is irrigated through the tube well through which irrigation is very costly as compared to the canal irrigation. This also compels the farmers to observe economy in water use. As per overall knowledge of the farmers about production of Rabi season fodder crops was concerned, it was found that they had 58.54 per cent of the knowledge, to improve the fodder production and productivity. Drought resistant fodder crop varieties should be evolved by the scientist to increase the production & producing.

Extent of overall knowledge on improved fodder production practices in semi -arid zone of Rajasthan

The Table- 4 indicates that the fodder growers were having 63.56, 63.37, 62.06, 61.87, 60.68, 59.18, 58.06, 57.43, 55.87, 55.75, 55.06 and 48.62 per cent knowledge about sowing time, fodder yield, harvesting, irrigation, seed rate, nitrogenous fertilizer use, land preparation, farm yard manure use, seeds, phosphatic fertilizer use, varieties and sowing methods aspect of improved fodder production practice, respectively in Semi- arid Zone of Rajasthan**.**

It can be inferred that the farmers were having highest knowledge on sowing time as compared to the other aspects of fodder production. As the crop production in the region is mainly dependent on the rainfall and if crops are sown at the improper time the yield may be reduced drastically. For proper utilization of moisture, farmers observe the proper sowing time thereby, having more knowledge in this aspect. In contrast, they were having least knowledge on sowing

methods as they were providing less importance to this aspect as these are not being grown for the grain purpose, moreover, sowing methods do not affect much of the fodder yield.

The overall knowledge of farmers about the fodder production practices in semi- arid zone was found to be the 59.16 per cent depicting a knowledge gap of about 41.00 per cent. If dairy development is to be carried out to provide livelihood security to the teeming millions especially the rural poor in the years to come, this knowledge gap needs to be abridged through proper policies and programmes.

Extent of knowledge of farmers about improved fodder production practices of fodder crops

The findings presented in Table-5 revealed that large and medium farmers having 66.99 and 62.82 per cent knowledge on improved fodder production. It was observed that marginal farmers had 56.32 per cent knowledge, as researcher observed that marginal farmers need to know more about improved production practices because they have less land compared to large and medium famers, therefore they grow more fodder in available land.

The results indicated that sorghum grower was having highest (61.78%) knowledge on improved fodder production practices. It might be due to the fact that sorghum crop is drought resistant fodder crop.

It was also observed that fodder growers, 58.82, 58.26 and 57.79 per cent knowledge about Lucerne, Kasni and Bajra; respectively in the study area. The pooled extent of knowledge on improved fodder production practices was found to be 59.16 per cent in the study area.

Relationship between selected traits of farmers and knowledge level of respondents

Correlation analysis

The correlation ('r') values have been worked out for selected traits, i.e., age, education, family size, land holding, herd size, milk production, social participation, extension contact, mass media and annual income with knowledge level of fodder growers in relation to improved fodder production practices. The 'r' values of knowledge and various traits of farmers have been presented in Table-6.

The correlation analysis unearthed, that out of ten independent variables, three namely, education (0.547), social participation (0.594) and annual income (0.298) were highly significantly and positively correlated with knowledge

It was observed that those farmers who have less family members, more social participation and annual income resulted in increase of knowledge on fodder production. Whereas, land holding size (0.159), herd size (0.135), milk production (0.144) and extension contact (0.152) was significantly related with knowledge at 0.5 percent level of probability. This finding indicates that with the increase in the land holding, extension contact and milk production, the knowledge regarding fodder production practice will also be enhanced.

It was logically justified if farmers will have more land, then area under fodder crops will definitely be more. More extension contact of the farmers will certainly enhance the knowledge regarding fodder production. However, age, education and mass media exposures could not reach the level of significant in demonstrating their relationship.

Table.1 Distribution of Farmers According to their Knowledge about Improved Fodder
Production Practices of Kharif fodder crops

(n=240)

Sl. No.	Crops	Category	Frequency	Percentage
1	Sorghum (Mean=29.65)	Low(<25.45)	42	17.50
		Medium(25.45-33.85)	154	64.17
		High(>33.85)	44	18.33
2	Bajra (Mean=27.73)	Low(<23.63)	32	13.33
		Medium(23.63-31.84)	168	70.00
		High(>31.84)	40	16.67

Table.2 Extent of Knowledge on improved fodder production practices of Kharif Season Fodder
crops

(n=240)

Sl. No.	Improved production practices	Knowledge (%)		
		Sorghum	Bajra	Pooled
1	Land preparation	57.75	59.52	58.63
2	Seeds	58.25	59.52	58.88
3	Sowing methods	49.25	48.25	48.75
4	Varieties	60.75	58.00	59.37
5	Seed rate	67.75	61.00	64.37
6	Sowing time	66.50	66.25	66.37
7	Farm yard manure use	60.50	58.25	59.37
8	Nitrogen fertilizer use	62.00	61.00	61.50
9	Phosphorus fertilizer use	58.75	48.75	53.75
10	Irrigations	69.00	51.25	60.12
11	Harvesting	66.25	59.50	62.87
12	Fodder yield	65.00	63.00	64.00
Pooled knowledge (%)		**61.78**	**57.79**	**59.78**

Table.3 Distribution of farmers according to their knowledge about improved fodder production
practices of Rabi Season crops

(n=240)

Sl. No.	Crops	Category	Frequency	Percentage
1	Lucerne (Mean=28.33)	Low(<23.92)	26	10.83
		Medium(23.92-32.54)	178	74.17
		High(>32.54)	36	15.00
2	Kasni (Mean=26.60)	Low(<22.81)	42	17.50
		Medium(22.81-30.39)	160	66.67
		High(>30.39)	38	15.83

Table.4 Extent of Knowledge on improved fodder production practices of Rabi fodder crops

(n=240)

Sl. No.	Improved production practices	Knowledge (%)		
		Lucerne	Kasni	Pooled
1	Land preparation	61.25	54.00	57.62
2	Seeds	55.75	50.25	53.00
3	Sowing methods	50.75	46.25	48.50
4	Varieties	54.00	47.50	50.75
5	Seed rate	57.00	57.00	57.00
6	Sowing time	61.50	60.00	60.75
7	Farm yard manure use	55.75	55.25	55.50
8	Nitrogen Fertilizer use	60.00	53.75	56.87
9	Phosphorus Fertilizer use	58.75	56.75	57.75
10	Irrigations	62.75	64.50	63.62
11	Harvesting	65.00	57.50	61.25
12	Fodder yield	63.50	62.00	62.75
Pooled knowledge (%)		**58.82**	**58.26**	**58.54**

Table.5 Overall Knowledge of farmers on improved fodder production practices

(n=240)

Sl. No.	Improved production practices	Pooled (Kharif+Rabi)
1	Land preparation	58.06
2	Seeds	55.87
3	Sowing methods	48.62
4	Varieties	55.06
5	Seed rate	60.68
6	Sowing time	63.56
7	Farm yard manure use	57.43
8	Nitrogen Fertilizer use	59.18
9	Phosphorus Fertilizer use	55.75
10	Irrigations	61.87
11	Harvesting	62.06
12	Fodder yield	63.37
Overall knowledge (%)		**59.16**

Table.6 Extent of knowledge of farmers about fodder crops (land holding wise)

(n=240)

Sl. No.	Farmers category	Sorghum	Bajra	Lucerne	Kasni	Pooled
1	Marginal	58.53	54.64	55.91	56.18	56.32
2	Small	59.02	55.48	57.44	55.80	56.93
3	Semi-Medium	61.84	58.50	58.99	58.54	59.47
4	Medium	67.36	60.47	61.46	62.00	62.82
5	Large	68.49	68.23	66.41	64.84	66.99
Pooled (%)		**61.78**	**57.79**	**58.82**	**58.26**	**59.16**

Table.7 Relationship between selected traits of respondents and knowledge

(n=240)

Sl. No.	Variables	'r'
1	Age	0.113
2	Education	0.547**
3	Family size	0.126
4	Land holding	0.159*
5	Herd size	0.135*
6	Milk production	0.144*
7	Social participation	0.594**
8	Extension contact	0.152*
9	Mass media exposure	0.119
10	Annual income	0.298**

** Significant at 0.01level of significance,* significant at 0.05 level of significance

Table.8 Regression analyses between independent variables and knowledge on improved fodder production practices

(n=240)

Sl. No.	Variables	Standard error	'b' value	't' value
1	Age	0.045	0.040	0.870
2	Education	0.262	0.097	1.089
3	Family size	0.325	0.346	6.871**
4	Land holding	0.062	0.052	2.068*
5	Herd size	0.241	0.085	1.971*
6	Milk production	0.131	0.043	2.014*
7	Social participation	0.878	0.411	8.030**
8	Extension contact	0.181	0.046	1.989*
9	Mass media exposure	0.188	0.083	0.971
10	Annual income	0.000	0.146	3.048**
$R^2=0.596$				

** Significant at 0.01 level of significance,* significant at 0.05 level of significance

Fig.1 Distribution of farmers according to their knowledge about improved
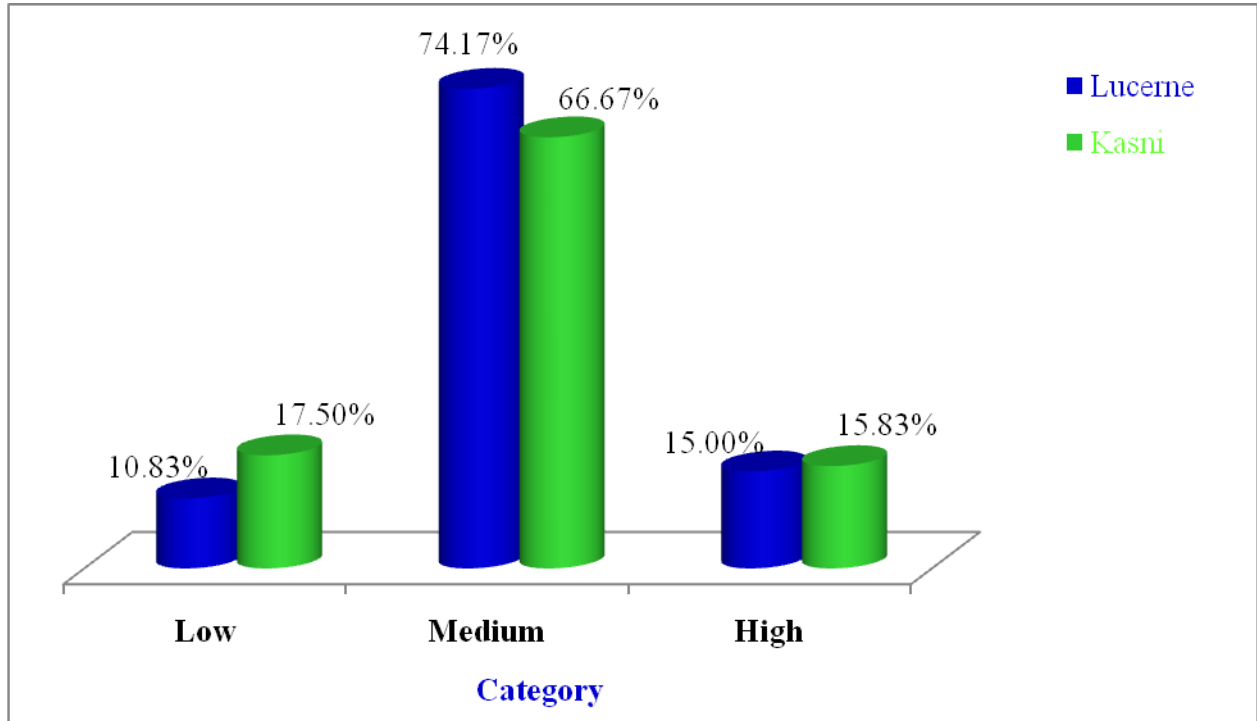fodder production practices of kharif fodder crops

Fig.2 Distribution of farmers according to their knowledge about improved fodder production
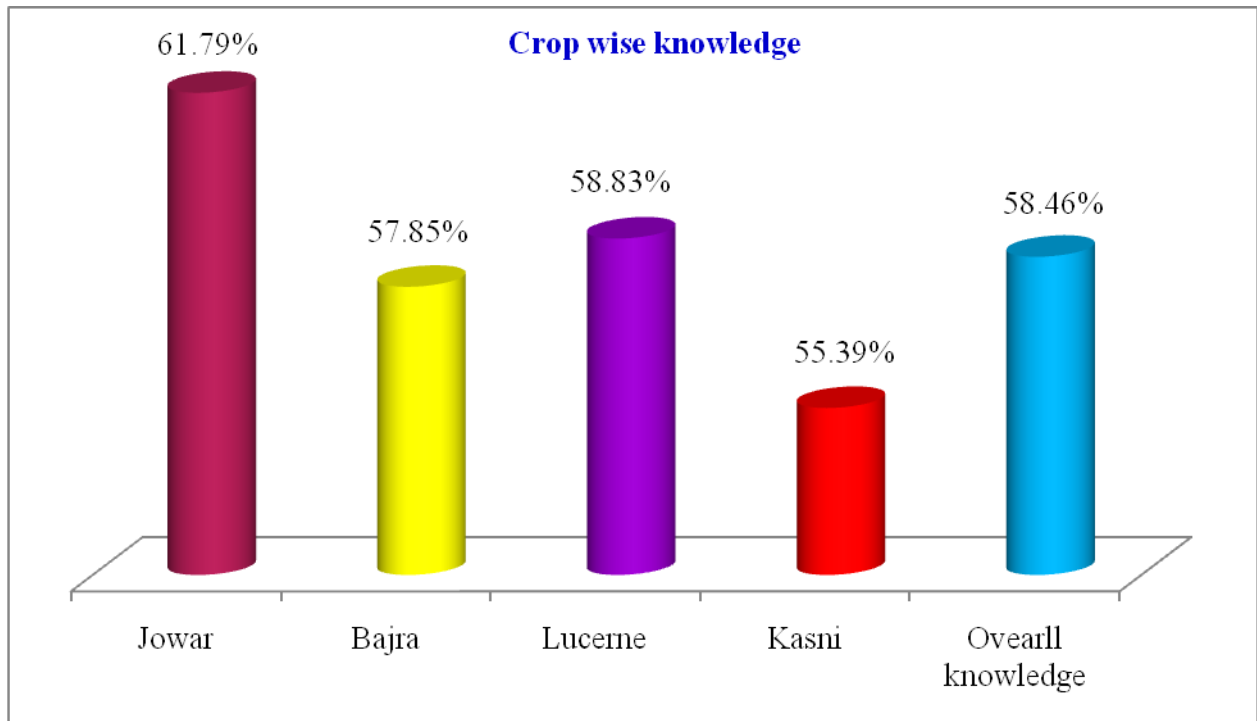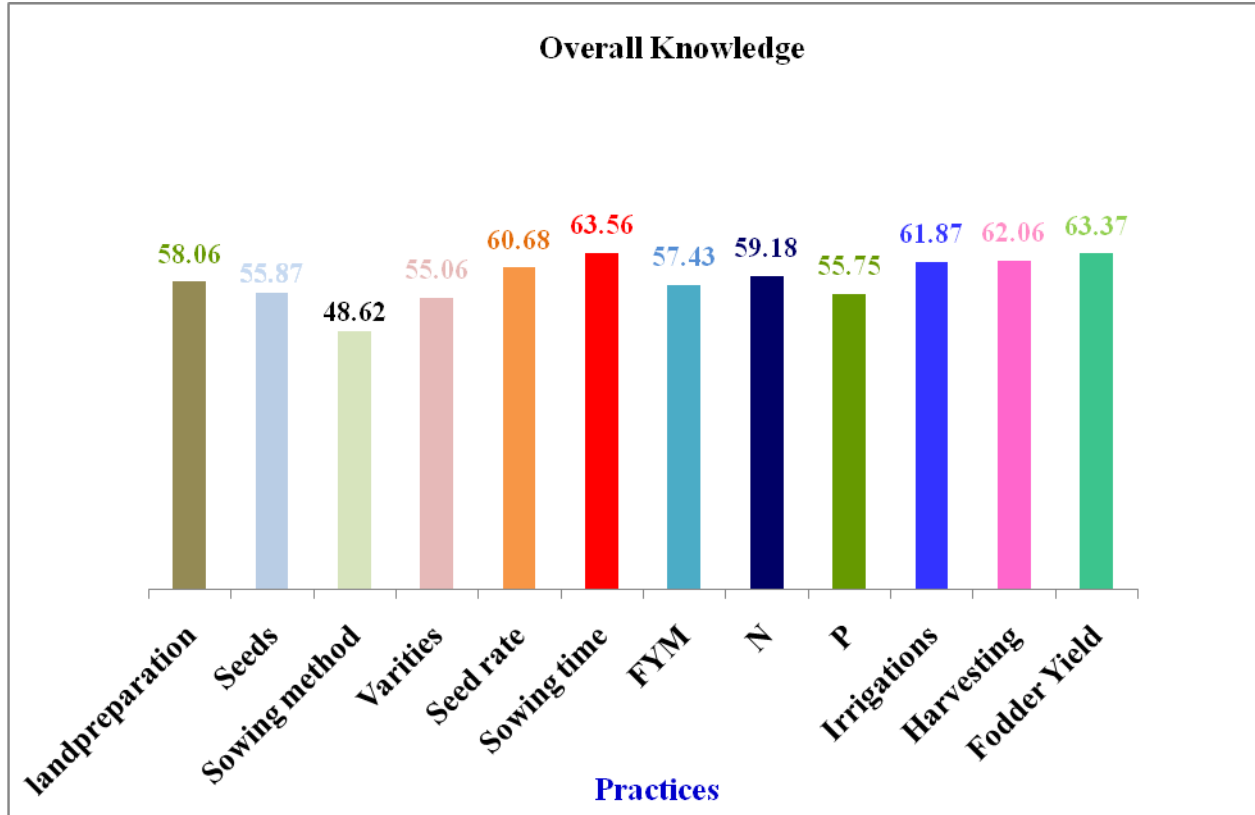practices of rabi season crops

Fig.3 Crops wise Knowledge on improved fodder production practices

Regression analysis

As correlation analyses indicate the relationship between dependent variable and one independent variable at a time, so multi regression analysis was employed. The idea behind this was to identify the factors contributing to the dependent variable that too in the presence of all pertinent variables. The results presented in Table-6 indicated that family size, social participation and annual income were contributing significantly at one percent level of significance, whereas, land holding, herd size, milk production and extension contact were found to have positive and significant regression coefficient with the knowledge at 5 percent level of significant. The ten variables explained variation in the dependent variable to the tune of 59.00percent. The findings line with the Goswami (2001), Kanan *et al.,* (2004) and Mande *et al.,* (2008).

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