J. Farm Sci., 37(2): (182-187) 2024

RESEARCH PAPER

Augmenting farmers income in North Karnataka through technology application for productivity enhancement and diversification

*M. J. CHANDRE GOWDA AND H. A. BINDU

ICAR-Agricultural Technology Application Research Institute, Bengaluru - 560 024, India
*E-mail: MJC.Gowda1@icar.gov.in

(Received: March, 2024 ; Accepted: May,2024)

DOI: 10.61475/JFS.2024.v37i2.17

Abstract: Enhancing farmers income is a major tool to sustain the agriculture and to ensure the farmers' welfare in the country. The technological interventions can aid in rising farmers' income by improving productivity for furthering intensification and diversification. The study assessed the impact of technologies implemented by 883 farmers under the guidance of six districts Krishi Vigyan Kendras in northern Karnataka. There was an increase in productivity in most crops during 2017 to 2021. The productivity level of respondent farmers was better than the average productivity of the region in most of the agricultural crops and vegetables. Average productivity achieved by KVK supported farmers compared to the region was low among some horticultural crops because of the low-cost, nature-friendly, bio-intensive approaches promoted by KVKs. Improved productivity led farmers to intensify and diversify farming wherein about 43 and 28 per cent of them intensified livestock rearing and horticulture crop production, respectively. Also, around 16 and 11 per cent of farmers diversified their horticultural and livestock components. Due to productivity led income enhancement, actual increase in income was maximum in the horticultural sector. Farmers in Bagalkot realized highest additional income (₹ 912437/household) and those in Belagavi obtained highest per cent increase in gross income (142.94%) over the benchmark year which was aided by higher index of diversity in sources of income.

Key words: Diversification, Farmers income, Productivity, Technology application

Introduction

Indian agriculture is dominated by low technology uptake and hence upgradation to high-tech methods have proven to be effective in increasing farm output, decreasing costs and thereby increasing farmers' income (Chand, 2019). Lack of access to credit, techniques and technology limit the farmers' income (Gulati *et al.,* 2021). Enhancing farmers' income demands higher output, by maintaining or lowering production expenses and minimizing post-harvest losses (Anonymous, 2018). Higher output is possible only through raising productivity per unit of land as the main engine of growth, considering almost every bit of cultivable land in India is already put under farming (World Bank, 2012; Motebennur, 2012). Promoting diversification with supplementary enterprises has proven their effectiveness in boosting farm incomes (Kumar, 2014). Growth in livestock and supplementary sources are vital for overall farm household income (Ranganathan, 2015; Yasmeen *et al.* 2019). The significance of diversifying towards high value crops and enterprises is particularly relevant as uneconomic land holdings limit the windows of income expansion. Diversity in farm activities lowers the degree of specialization and the associated risks. In general,increasing production using technology could contribute to about 30 per cent of farmers' income; another 30% is possible through value addition and cost reduction; and the remaining from institutional innovations such as producer aggregation, price realization and insurance back-up (Anonymous, 2019). Besides irrigation and mechanization, farmers' experience has been a significant determinant of diversified farm income, which helps in strategic combination of enterprises on the same land with similar inputs. In accordance with the above and in line with the national goal of doubling farmers' income, Krishi Vigyan Kendras promoted technology-driven income enhancement strategy with the farmers in their jurisdiction. The efforts resulted in many successful cases within a short span of time. It was interesting to note the composition of farm activities adopted by successful farmers and contribution of different components in increasing productivity and income. Hence, the study was undertaken to analyze the extent of impact of KVK interventions in changing productivity and its consequences on cropping and farming pattern adopted by farmers to increase and sustain farm income.

Material and methods

The objective of the paper was to measure the effect of technology application on productivity, diversification and income enhancement in the region. Change in productivity from 2016-17 to 2020-21 were estimated and analyzed for before-after differences. The productivity of the KVKs supported farmers was compared with the average productivity in the region based on the secondary data (DES, 2021).

The farmers benefited from the technological interventions of Krishi Vigyan Kendras (KVKs) during 2017 to 2021, located in the Northern Dry Zone (Bagalkot, Gadag and Vijayapura) and Northern Transition (parts of Belagavi, Dharwad and Haveri) agro-climatic zones under the Doubling of Farmers Income initiative of Government of India were purposively selected as the 'respondent farmers' of the present analysis. Only those farmers whose details on holding, crops/livestock/ enterprises practiced and economics of these activities available

with the KVKs for base year (2017) and evaluation year (2021) were considered for sampling. Thus, a total of 883 successful farmers functioning in the given districts were considered for the analysis on impact of KVK interventions. The sample included 219 farmers from Vijayapura district and 221 farmers from Belagavi district which have two KVKs each, 112 farmers from Dharwad district, 111 farmers from Gadag district and 110 farmers each from Bagalkot and Haveri districts. Paired 't' test was used to assess the difference in the productivity and income levels of evaluation year (2021) compared to benchmark year (2017). This test was limited to the data of farmers who cultivated the same crop or practiced same activity during both benchmark and evaluation year.

The extent of income source diversification was calculated using Simpson's Index of Diversity (SID) (Tiwari *et al.* 2023), which is adapted and measured as

$$SID = 1 - \sum_{t=1}^{n} \left[\left(\frac{AI}{THI}\right)^2 + \left(\frac{HI}{THI}\right)^2 + \left(\frac{LI}{THI}\right)^2 + \left(\frac{FI}{THI}\right)^2 + \left(\frac{SEI}{THI}\right)^2 \right]$$

Where, *SID* (Simpson index of diversity), *AI* (agricultural income), *HI* (horticultural income), *LI* (livestock income), *FI* (fisheries income), S*EI* (supplementary enterprises income) and *THI* (total household income). The value of SID ranges from zero (0) to one (1). The index value towards 0 indicates revenue from single source, while its value towards 1 indicates diversified source of income from all five components.

Results and discussion

Change in productivity

With the adoption of technologies demonstrated through KVK interventions, farmers were able to increase the productivity of agricultural crops, the results of which are given in Table 1. In most of the crops, the increase in productivity due to KVK interventions was in the range of 30 to 40 percent, over the benchmark year, with an exception of paddy (11%), bajra (15%) and sunflower (-20%). Productivity in pulses recorded a huge jump (up to 68.28% in blackgram), compared to benchmark year (2017). Highest increase in productivity was also observed in wheat (among cereal crops) and groundnut (among oilseed crops). Increase in productivity was also observed in commercial crop like cotton (29%). Increased productivity could be attributed to adoption of new and improved varieties/hybrids, good management practices and timely adoption of the recommended package of practices.

The results are in line with the findings reported by Chandana *et al.* (2022), Rani *et al.*(2022) and Zabihullah *et al.* (2022). Investing in productivity and competitiveness within a sector enables farmers to enhance and stabilize their incomes (Anonymous 2017).

In comparison with the rise in productivity over benchmark year within the respondent farmers, the difference in productivity over other farmers in the region was found to be very high. The difference over regional average was the highest in greengram and blackgram (over 300%) and cotton (243%).The various technological interventions responsible for rise in productivity, reduction in cost of cultivation and higher returns per unit of resources used are detailed below.

Cereals and pulses

Introduction of improved varieties in paddy (RNR-15048, MGD-03), wheat (UAS-304, UAS-334, UAS-375, UAS-446, DDK-1029, DWR-165, DWR-225), sorghum (SPV-2217, BGV-44, CSV-29), chickpea (JAKI-9218, JG-11, JG-14, BGD-111-1, GBM-2), pigeonpea (TS-3R, GRG-811, GRG-152, BSMR-736), blackgram (DU-1), and greengram (DGGV-2, IPM-02-14) contributed to increase in yield. Integrated pest management of fall army worm in maize and sorghum, biological control of root grub in maize, wider row spacing technology in bajra, use of pulse magic, nipping and mechanical harvesting in chickpea helped farmers

Table 1. Impact of interventions on productivity of agricultural crops

Crop	Productivity (q/ac)				Productivity (q/ac)		
Cereals	Respondent farmers 2017	Respondent farmers 2021	% Change over 2017	't' value	Regional average 2021	Respondent farmers 2021	% Difference over regional average
Paddy	23.12	25.69	11.12	8.216**	16.30	25.69	57.61
Wheat	7.18	10.09	40.47	10.326**	4.32	10.09	133.56
Maize	17.69	24.53	38.69	10.842**	14.22	24.53	72.50
Sorghum	4.65	6.18	32.83	23.006**	3.66	6.18	68.85
Bajra	8.07	9.27	14.89	#	5.16	9.27	79.65
Pulses							
Chickpea	4.49	6.18	37.78	18.002**	2.50	6.18	147.20
Pigeonpea	4.28	6.91	61.38	26.109**	2.67	6.91	158.80
Blackgram	3.69	6.21	68.28	2.526	1.51	6.21	311.26
Greengram	3.45	4.90	41.84	20.047**	1.17	4.90	318.80
Oilseeds							
Groundnut	7.08	9.93	40.25	13.349**	4.06	9.93	144.58
Soybean	5.93	8.23	38.86	#	5.70	8.23	44.39
Sunflower	8.82	7.01	-20.49	#	3.63	7.01	93.11
Commercial crops							
Cotton	6.73	8.69	29.19	6.842**	2.53	8.69	243.48

Note: ** indicates significance at five per cent level of probability, # test was not carried out due to smaller sample size

Table 2. Impact of interventions on productivity of horticultural crops

Crop	Productivity (q/ac)				Productivity (q/ac)		
	Respondent farmers 2017	Respondent farmers 2021	% Change over 2017	't' value	Regional average 2021	Respondent farmers 2021	% Difference over regional average
Fruits							
Mango	77.86	89.20	14.57	2.993**	17.03	89.20	423.78
Grapes	84.17	99.85	18.63	11.292**	107.41	99.85	-7.04
Guava	61.13	70.79	15.81	5.384**	51.23	70.79	38.18
Papaya	89.00	231.53	160.14	#	263.83	231.53	-12.24
Pomegranate	40.46	52.00	28.54	9.707**	58.83	52.00	-11.61
Sapota	60.62	59.64	-1.61	#	32.21	59.64	85.16
Vegetables							
Potato	55.00	94.19	71.26	#	39.22	94.19	140.16
Tomato	114.40	158.05	38.15	3.774**	37.04	158.05	326.70
Onion/White onion /Rose onion	51.98	65.64	26.27	5.042**	23.09	65.64	184.28
French beans	16.85	36.05	113.95	#	45.04	36.05	-19.96
Cabbage	111.67	199.11	78.31	#	85.59	199.11	132.63
Brinjal	59.13	122.67	107.44	3.325**	47.62	122.67	157.60

Note: ** indicates significance at five per cent level of probability, # test was not carried out due to smaller sample size

to reduce cost of cultivation thereby adding to income. Intercropping of greengram+pigeonpea, maize+pigeonpea, and foxtail millet+pigeonpea helped farmers to realize higher income per unit of land and other resources.

Oilseeds

The increase in productivity was observed due to introduction/promotion of high yielding varieties in groundnut (GPBD-4, GPBD-5, G2-52, TGLPS-3, ICGV-06184, Dh-101, Dh-256), soybean (DSb-21, DSb 34, JS-335, KDS-753, KDS-726) and sunflower (RSFH-1887, KBSH-53).

Commercial crops

Root grub and striga management, nutrient management, pre and post-emergent weed management, and water management through drip irrigation enhanced productivity and income in sugarcane. Integrated pest management in cotton through installation of pheromone traps and sticky traps, spraying of neem oil and need-based use of systemic insecticides, and pink boll worm management in cotton reduced the cost of cultivation and contributed to income. Intercropping of onion, chilli, soybean in sugarcane and intercropping of soybean and peas in cotton increased the income per unit of resources used.The differences in productivity over the average yield levels in the region indicate a huge potential for increasing the food production and contribution to national food basket. The results prove the productive potential of improved varieties and good agricultural practices in improving productivity.

Table 2. indicates the impact of interventions on productivity of horticultural crops. Increase in productivity was observed in all the horticultural crops, except sapota. Farmers cultivating papaya among fruits and beans among vegetables under the KVK guidance observed highest increase in productivity over the benchmark year. The various technological interventions responsible for rise in productivity and reduction in cost of cultivation under different fruit and vegetable crops are detailed here. Introduction of improved varieties in onion (Bhima Super, Bhima Shakthi, Arka Lalima, Arka Kalyan, Bhima Shubra) and tomato hybrids (Arka Rakshak, Arka Samrat, Arka Abhed) along with Arka Vegetable Special helped farmers to achieve higher productivity. The reduction in cost of cultivation was achieved with the help of integrated crop management practices. Use of solar traps, methyl eugenol fruit fly traps, yellow and blue sticky traps for pest management in fruit and vegetable crops, use of bio-agents *viz*., *Trichoderma, Pseudomonas, Paecilomyces*, management of twisting disease in onion, and use of Arka microbial consortia helped in management of pests and diseases in horticultural crops. The integrated pest management strategies were adopted to manage tomato pin worm, nematode infestation, sucking pests, shoot borers and diamond back moth. Also,farmers realized additional income due to intercropping system in horticulture crops (mango+ radish+ palak, mango+ maize, mango+ marigold, mango+ soybean and guava+onion), high-density mango and guava plantation, value addition and contract farming as a strategy for assured marketing of fruit crops.

Table 3. Impact of interventions on productivity of livestock

Particulars	2017	2021	't' value	% Change
Cow/cross bred/desi (litres/lactation)	882.99	1184.88	2.962**	34.19
Buffalo (litres/lactation)	835.01	999.88	2.719**	19.74

Note: ** indicates significance at five per cent level of probability

However, unlike in food crops, the difference in productivity of horticultural crops over the average yield levels in the region was interestingly different. The average yield levels of the respondent farmers growing grapes (-7%), papaya (-12%) and pomegranate (-12%) were less than the regional average productivity. The same was observed for French beans (-20%) among vegetables. This was mainly due to the low-cost, nature-friendly, bio-intensive approaches promoted by KVKs compared to intensive,chemical-based high cost approaches adopted by farmers, which fetched higher yields, but at the cost of profitability and environmental considerations.

Table 4. Options explored by farmers to enhance farm and household income

Options to increase farm and household income	No. of farmers			
	Agriculture	Horticulture	Livestock	Supplementary Enterprises
No change	455 (50. 22)	545 (50.75)	428 (42.50)	779 (82.17)
Intensification	124 (13.69)	297 (27.65)	437 (43.40)	101 (10.65)
Diversification	5 (0.55)	181 (16.85)	120 (11.91)	64 (6.75)
Decrease in area	304 (33.55)	41(3.82)	18 (1.79)	3 (0.32)
Discontinuation	18 (1.99)	10 (0.93)	4 (0.40)	1 (0.11)
	906 (100)	1074 (100)	1007 (100)	948 (100)

Note: Figures in parenthesis indicate percentage to the total

The impact of interventions on productivity in animal husbandry sector was also documented and is depicted in Table 3. More than 300 litres/lactation increase in milk productivity in cows and 160 litres per lactation increase in milk productivity in buffaloes was observed due to the interventions. Introduction of fodder varieties (DHN 6, CoFS-29, CoFS-31, Co-5, Lucerne, RL-88, Anand-2) enhanced the green fodder consumption thereby adding to the milk yield. Promotion of balanced nutrition with area-specific mineral mixture added to increased milk yield. Feed formulation based on locally available raw material, production and use of azolla, and silage making of surplus fodder reduced the cost on feed and fodder. Management of mastitis, vaccination and disease management in cattle led to clean milk production, thereby increasing the number of milch days and enhanced milk yield per lactation.

Enhanced productivity leads to intensification and diversification

The gain in productivity due to technology adoption enabled the respondent farmers to explore multiple options to realize higher income. The first option was to continue adoption of technologies in the prevailing cropping system and harness productivity enabled income enhancement without changing the structural composition of the farm. The second option was to intensify the currently grown profitable crops by expanding the area or number of animals. This was particularly dominant in the livestock component, wherein 43.40 per cent of the farmers increased the number of animals reared. This was also noticed for the horticultural component, as about 27.65 per cent of the farmers intensified the area under horticultural crops currently grown. The third option was to diversify to new crops and activities, which was particularly evident for introducing new horticultural crops (16.85%). Intensification and diversification were possible by decreasing area under agricultural food crops (33.55%), which might be because of less profitability of these crops compared to horticulture and livestock components.As many as 304 farmers decreased the area under agricultural crops and 18 farmers discontinued cultivation of agricultural crops (Table 4).

Further analysis of the decrease in agriculture crop area and the options exercised by the farmers in intensification and diversification is presented in Table 5.The farmers who had decreased area under particular sector extended their cultivation to other sectors. Out of 304 farmers who decreased area under agricultural crops, 153 farmers (50.32%), started cultivation of new horticultural crops (diversification). It was also evident that 39 farmers preferred rearing of livestock and 28 farmers started supplementary enterprises as a new activity, which were the signs of diversification. As many as 138 farmers (45.39%) strengthened livestock component by increasing the number of animals and 67 farmers (22%) increased the area under existing horticultural crops (intensification). Those who decreased area under horticulture crops (41 farmers), intensified the livestock component (23 farmers) and agriculture cash crops like cotton and sugarcane (21 farmers). Many of the farmers started supplementary enterprises and intensified livestock rearing. Among the farmers who reduced rearing of livestock, many of them started cultivation of horticultural crops. This explains

Table 5. Intensification and diversification as a result of increased productivity

Option to increase farm and house hold income	Decreased area under agriculture (n=304)		Decreased area under horticulture crops (n=41)		Decrease in livestock rearing (n=18)		Decrease in supplementary enterprises (n=3)	
Intensification	Increased area under horticulture	67 (22.04)	Increased area under agriculture	21	Increased area under agriculture	0	Increased area under agriculture	1
	Increased livestock	138 (45.39)	Increased livestock	23	Increased area under horticulture	8	Increased area under horticulture	2
Diversification	Started horticulture	153 (50.33)	Started agriculture	0	Started agriculture	1	Started agriculture	1
	Started livestock	39 (12.83)	Started livestock	3	Started horticulture	3	Started horticulture	0
	Started an enterprise	28 (9.21)	Started an enterprise	8	Started an enterprise	1	Started livestock	1

Table 6. Component-wise income (₹ /household/annum) and the level of diversification (SID) among farmers in different districts of North Karnataka

Sources of Income	Year	Bagalkot	Belagavi	Dharwad	Gadag	Haveri	Vijayapura	Total	't'value
Agriculture	2017	407644	219924	302297	70830	156707	183977	131055	18.021**
	2021	701971	445435	500686	111021	225287	330616	279774	
	Change	294327	225511	198389	40191	68580	146639	148719	
	%	72.20	102.54	65.63	56.74	43.76	79.71	113.48	
Horticulture	2017	330935	46487	136350	34104	66877	219102	87173	16.184**
	2021	738305	170748	310866	92861	156288	503339	242191	
	Change	407370	124261	174516	58757	89411	284237	155018	
	%	123.10	267.30	127.99	172.29	133.69	129.73	177.83	
Livestock	2017	88583	28557	61029	14227	27290	43471	26536	9.981**
	2021	256728	85122	154581	56179	92039	133390	83675	
	Change	168145	56565	93552	41952	64749	89919	57139	
	%	189.82	198.08	153.29	294.88	237.26	206.85	215.33	
Fisheries	2017	182	0	0	0	0	0	182	2.408
	2021	12500	1294	2480	0	73	1493	1915	
	Change	12318	1294	2480	0	73	1493	1415	
	%	6768.13	-	-	0	-	-	283	
Supplementary enterprises	2017	15636	11057	3571	183	13977	3858	5061	6.616**
	2021	45913	40866	57786	5628	47265	19571	22063	
	Change	30277	29809	54215	5445	33288	15713	17001	
	%	193.64	269.59	1518.20	2975.41	238.16	407.28	335.91	
Total	2017	842980	306025	503247	119344	264851	450408	249830	27.038**
	2021	1755417	743465	1026399	265689	520952	988409	629618	
	Change	912437	437440	523152	146345	256101	538001	379787	
	%	108.24	142.94	103.96	122.62	96.70	119.45	152.02	
SID	2017	0.601	0.450	0.551	0.599	0.573	0.587		
	2021	0.641	0.572	0.644	0.417	0.684	0.610		
	Change	0.040	0.122	0.093	-0.182	0.111	0.023		

Note: **indicates significance at five per cent level of probability

the impact of interventions on farmers to diversify the farming. There were few farmers (18) who discontinued the farming in particular sector, majority of whom started cultivation of horticultural crops (66.66%) and others started new livestock and supplementary enterprises. This indicated that, with the technological interventions, the respondent farmers shifted towards profitable components.

Impact of KVK interventions on change in gross income from different sources in different districts is presented in Table 6. Increase in household total income from agricultural crops was relatively low compared to other sectors and it was highest in Belagavi (102.54%) and least in Haveri (43.76%). The absolute increase in income was greater from horticulture sector, which was highest in Bagalkot district (₹ 407370/ household) and least in Gadag district (₹ 41952/ household). The percent increase in gross income over benchmark year was above 100% in all the districts from livestock (minimum of 153.29% in Dharwad and maximum of 294.88% in Gadag). Addition of fisheries and supplementary enterprises to household income is a new phenomenon as evident from very low income during benchmark year, but has shown remarkable potential due to KVK interventions. Overall, the index of diversity (SID values) increased more in Belagavi (+0.122) and its impact on income was also evident with an overall increase in income of 142.94 per cent over benchmark year.

Conclusion

The results presented in the paper pertain to successful farmers benefited from the technological interventions implemented by the Krishi Vigyan Kendras in the northern parts of Karnataka. The districts with lower level of regional average productivity compared to KVK supported farmers need to harness the power of improved technologies and bridge the gap between prevailing and potential yield levels. Convinced by the positive results, many respondent farmers expanded the current practices, particularly by intensifying the prevailing livestock and horticultural components.Some farmers went for diversification with new horticultural crops, livestock and supplementary enterprises to maximize income. Intensification and diversification were possible by decreasing area under less-profitable agricultural food crops, which could be a concern for national food security, if other farmers follow this trend. Similarly, expanding area under horticulture needs to be closely monitored for strengthening the required market and post-harvest infrastructure.The emerging interest in supplementary enterprises needs to be sustained and promoted through supportive policies and financial services.

References

Anonymous, 2017, Southeast Asia: Prospects and challenges. OECD-FAO Agricultural Outlook 2017-2026. FAO, Rome, pp. 59-99.

Anonymous, 2018, Doubling of farmers income by 2022 - Strategy document for Odisha. ICAR-National Rice Research Institute, Cuttack, Odisha, India.

Anonymous, 2019, State specific strategies for doubling farmers income-2022, Indian Council of Agricultural Research, New Delhi, India. pp. 249-268.

Chand R, 2019, Transforming agriculture for challenges of 21st century. *Indian Economic Journal,* 15(4): 1-23.

Chandana B, Kumar G D S, Sengar R S and Nagaveni M, 2022, Strategies for increasing area and productivity of sunflower (*Helianthus annuus* L.) in India. *Agricultural Research Journal,* 59(4): 677-682.

DES, 2021, Annual report, Fully revised estimates of area, production and yield of principal crops in Karnataka for the year 2020-21. Directorate of Economics and Statistics, Bengaluru.

Gulati A, Saini S and Roy R, 2021, Going beyond agricultural GDP to farmers' incomes. Revitalizing Indian Agriculture and Boosting Farmer Incomes. *Indian Studies in business and Economics.* Springer, Singapore. (https://link.springer.com/chapter/10.1007/978-981-15-9335-2_10).

Kumar P, 2014, Technologies to boost agriculture production. *Kurukshetra*, 62(8): 16-18.

Motebennur S S, 2012, Spatial variations in agricultural productivity of Dharwad district in Karnataka state. *Paripex Indian Journal of Research,* 1(11): 53-56.

Ranganathan T, 2015, Farmers' income in India: Evidence from secondary data. *Agricultural Situation in India,* 72: 30-70.

Rani S U, Kumar P, Singh N P, Paul R K, Padaria R N and Geetha M L, 2022, Instability analysis of agricultural productivity: A district level assessment in Karnataka state in India. *International Journal of Environment and Climate Change,* 12(1): 33-43.

Tiwari U, Singh A, Kumar P P, Venkatesh P, Singh R, Kumar A, Bisen J and Kumar H V H, 2023, Status and changes in composition of agricultural household's income in India. *Indian Journal of Extension Education,* 59(1): 59-64.

World Bank, 2012, India: Issues and Priorities for Agriculture. https://www.worldbank.org/en/news/feature/2012/05/17/india-agriculture-issues-priorities

Yasmeen, Patil S S, Ram J, Hiremath G M and Koppalkar B G, 2019, An economic analysis on factors influencing the family income of livestock farmers: A North-Eastern Karnataka study.

Zabihullah, Sonnad J S, Murthy C and Kulkarni G N, 2022, A study on the dynamics of trends in area, production and productivity of groundnut in Karnataka. *Journal of Farm Sciences,* 35(1): 160-161.