

AREA PRODUCTION AND PRODUCTIVITY OF PADDY, MAIZE, RAGI AND JOWAR IN KARNATAKA

Abdul Rizwan Shariff

Tumkur University

Abstract

Fast growing population in many countries is one of the reasons for enormous increasing demand for food. Farmers and researchers should be aware that cost-benefit ratio bringing new land under cultivation is smaller than that of increasing production of already cultivated land. Increase of food production in the available cultivated land is depending upon the maintenance of the soil health. Continuously growing of a same crop over years in the same cultivated area leads to ill health of the soil and cause for increase in various pest and diseases. For the current study, the selected crop constitutes of Paddy, Ragi, Maize and Jowar based on the area, productivity in the state of Karnataka. The areas of the study are four districts from Karnataka which include Mysuru, Davangere, Kalaburagi and Vijaypur. The sample size of the study is 480 farmers spread across the selected area of the study for the selected reference crops. The data is collected to know the area, production and productivity of the reference crops.

Key Words: Area, Production, Productivity, Ragi, Maize, Paddy and Jowar

INTRODUCTION

Aggarwal et al (1992) reported that the yield advantage of any intercrop is attributed to below- and above-ground plant interactions which are likely to vary depending upon the temporal and spatial differences in resource use by component crops. Thus, a fundamental understanding of how intercrops capture and use resources would provide a scientific basis of recommending appropriate crop combinations and spatial arrangements at different locations. Willey (1979b) reported that intercrop performance can be improved with respect to temporal and spatial complementarities by improving the compatibility of genotypes used as components of the mixture.

Presently, interest in intercropping is increasing and fast becoming important among the small scale farmers because of their diversified needs and low farm income from the mono-cropping system. The challenge therefore is to identify crops capable of sustaining their potential yield when grown in specific row arrangements with other crops. Spitters (1983) reported that yield of grain per unit area is an essential measure of mixture performance which represent only a part of total plant biomass and may not fully reflect the result of competition between species in mixture. A number of indices such as land equivalent ratio, relative crowding coefficient, competitive ratio, actual yield loss, monetary advantage and intercropping advantage have been proposed to describe competition within and economic advantages of intercropping systems (Banik et al., 2000). The idea of sustainable agriculture among others includes the adoption of agricultural practices used in low-input traditional farming such as growing arable crops in mixtures (intercrops). Intercropping of cereals with legumes has been popular in tropics (Hauggard-Nielsen et al., 2001) and rain-fed areas of the world (Banik et al., 2000) due to its various advantages (Chen et al., 2004, Agegnehu et al., 2006). Mixed cropping or intercropping is an important practice considered as part of the subsistence farming designed to meet the increase in domestic food requirements.

Maize: To overcome the problem of ill health one can use alternate methods like intercropping, relay cropping, mixed cropping and so on. Maize is a principle rainy season crop; it is extensively grown in Karnataka. Increase in the area and production has been clearly noticed in the above table. Because of its requirement of less labour force, easy post harvest mechanism, well established marketing and prevailing rainfall distribution, this crop is very well catching up in the state. Maize requires high plant nutrients, hence growing of this crop alone over the years will barren the land and cause for decline in productivity.

Paddy (Rice): Paddy (rice) has been an important foodgrain crop, which has been traditionally cultivated and consumed throughout India. Possibly this is one among the rare crops which is consumed by all class of consumers; poor, middle and rich income group. It is for this reason that paddy is always treated as an important and sensitive crop from the view point of consumers in India. It is also an important crop for farmers, since it seems to provide an assured income for them because of having relatively better procurement and pricing policies implemented by the government agencies. Rice originated at least 130 million years ago as wild grass. Cultivated rice, as we know it today, was first grown about 10,000 years ago

in south-east Asia, probably in India. Rice is the world's most adaptable crop. It can be grown in desert, slash and burn forests, 3000-meter high mountains, 3 meters below sea level and 8 feet of flood water. Rice is not a tropical plant, but is still associated with a wet, humid climate. It is generally believed that the domestication of rice began somewhere in the Asian arc.

Ragi: *Eleusine coracana*, also known as African millet or ragi, is widely grown in Africa and Asia. It is originally native to the Ethiopian Highlands though it was introduced in India a long time ago. Its adaptability to the higher elevations makes it suitable to grow even at a height of more than 2,000 meters. Although statistics on individual millet species are not very accurate, it is estimated that ragi is grown on approximately 38,000 sq km. It is also, often intercropped with peanuts, cowpeas, pigeon peas or other plants. Ragi has an important protein component, amino acid methionine, which makes it an important low-cost ingredient for fulfilling the protein intake requirements of millions of poor who generally live on starchy staples e.g. plantain, polished rice, or maize.

Most of these benefits peg ragi with a potential to improve nutrition, food security, as well as to foster rural development and support sustainable land use. In India, ragi is mostly grown and consumed in Rajasthan, Karnataka, Andhra Pradesh, Tamil Nadu, Orissa, Maharashtra, Kumaon region of Uttarakhand and Goa; of which, Maharashtra, Tamil Nadu and Uttarakhand produce the bulk of ragi in the country. There are significant yield variations observed even among the top producing States. Post-harvest management of ragi is unproblematic; the seeds are seldom attacked by insects or moulds and combined with a longer shelf life make the finger millet an important crop in risk-avoidance strategies for poorer farming communities. The price variations across States are not very high, hence, the commodity has much better price stability too. Despite so many advantages the ragi has not grown to be a major crop in our country due to its designation as a low-value inferior crop alongside other millets.

Jowar: Sorghum popularly known as jowar is the most important food and fodder crop of dry land agriculture. The cereal crop is perennial in nature and possessing corn like leaves and bearing the grain in a compact cluster. Sorghum is the fifth most important cereal crop in the world after wheat, rice, maize and barley. It is found in the arid and semi arid parts of the world, due to its feature of being extremely drought tolerant. The nutritional value of sorghum is same as of that of corn and that is why it is gaining

importance as livestock feed. Sorghum is also used for ethanol production, producing grain alcohol, starch production, production of adhesives and paper other than being used as food and feed. Jowar is one of the major staple food grain crops in India. Out of the total area under jowar cultivation in India, 50% is cultivated in Maharashtra. Whereas out of the total production of Jowar in the nation, 52% is from Maharashtra. Karnataka, Andhra Pradesh, Tamil Nadu. One more advantage of this crop is that it can be grown in both Kharif and Rabi season. Also, it can handle and grow on a wide range of soil types starting from fertile to less nutrient soils but an effective output largely depends on soil moisture, resistance and porosity.

METHODOLOGY:

The areas of the study are four districts from Karnataka which include Mysuru, Davangere, Kalaburagi and Vijaypur. The sample size of the study is 480 farmers spread across the selected area of the study for the selected reference crops. The data is collected to know the area, production and productivity of the reference crops. The Sampling method adopted for the study to ascertain the objectives is the Probability Sampling Technique particularly the **Multi-stage** sampling method. The entire Karnataka state is divided into districts, districts are divided as taluka and taluka are further divided into villages. First Stage of Sampling: From the entire Karnataka state, four districts i.e. Davanagere, Kalaburagi, Vijaypura and Mysore are selected based on the production, productivity and yield ragi, maize, jowar and paddy. Each district is considered as the block and four cereal crops representing the strata's constituting Area and Stratified Sampling Technique. From each block (district), taluka's is considered based on the cultivation of the crops selected for the study constituting the Area sampling technique. From the each taluka, five villages creating sub-blocks which cultivate the highest amount of the crops are selected. From each of these sub-blocks, five farmers who are cultivating higher quantity the selected crops constituting cluster sampling are taken as the sample items for the study. All the agriculturists were given questionnaire which was tested scientifically for the reliability and validity and internal consistency.

RESULTS AND DISCUSSION:**Table 1: Respondent age wise distribution of sample rural households**

Sl. No.	Age Category	Mysuru		Davangere		Kalburgi		Vijayapur		Pooled	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	Young (<40 years)	41	34.17	39	32.50	47	39.17	52	43.33	179	37.29
2	Middle (40-47 years)	30	25.00	24	20.00	23	19.17	36	30.00	113	23.54
3	Old (> 47 years)	49	40.85	57	47.50	50	41.67	32	26.67	188	39.17
	Total	120	100	120	100	120	100	120	100	480	100

Source: Primary Data

Table-1 represents the age wise distribution of sample rural household in Mysuru, Davanagere, Kalaburagi and Vijayapura. According to the Table-1, it is evident that 34.17% of the households are young who belong to the age group of <40 from Mysuru, 32.50% of the sample households belong to the age category of <40 in Davagere, around 39.17% of the households belong the age category of <40 from Kalaburagi and 43.33% of the household from Vijaypur belongs to the age category of <40 years indicating that highest number of the sample households of the study belong to Vijaypur. 25.00% of the rural households form Mysuru belong to the age category of 40-47 Years, followed by 20.00% from Davangere, 19.17% of the rural household from the sample belongs to the age category of 40-47 from Kalaburagi and 30.00% of the sample households are from Vijaypur indicating highest percentage of middle age group are from Vijaypur. There are about 40.85 of the sample households belong to the age category of >47 in Mysuru, followed by 47.5% from Davangere, for about 41.6% of the sample households are from Kalaburagi who belong to the age category of >47 and 26.6% of the households belong to the age category of >40 in Vijaypur. Out of 480 sample households', 37.29% belong to the age category of <40 years, 23.54% belong to

category of 40-47 years and 39.17% of the households belong to the category of >47years. The majority of the sample households belong to the age category of >47.

Table 2: Distribution of rural households by family size

Sl. No.	Family size (Members)	Mysuru		Davangere		Kalburgi		Vijayapur		Pooled	
		No.	%	No.	%	No	%	No	%	No	%
1	Small (Up to 4)	85	70.83	87	72.50	26	21.6	50	41.6	24	51.67
2	Medium (5-8)	33	27.50	27	22.50	61	50.8	40	33.3	16	33.54
3	Large (> 8)	2	1.67	6	5.00	33	27.5	30	25.0	71	14.79
	Total	120	100	120	100	120	100	120	100	480	100

Source: Primary Data

The distribution of the rural households' by family size across the area of the study is illustrated in the Table-2. The family size is divided into small, medium and large based on the number of the members where small family is composed of members up to 4, medium sized family is composed of members up to 5-8 and large family is composed of members more than 8. 70.83% of the households belong to small family in Mysuru, 72.50% of the household belongs small family from Davangere, 21.6% and 41.6% of the sample households belong to the category of small family from Kalaburagi and Vijayapur respectively. Similarly, 27.5% of them belong to medium family from Mysuru, 22.50% of the respondents belong to medium sized family from Davangere, 50.83% of the households belong to medium sized family from Kalaburagi and 33.33% of them belong medium sized family from Vijayapur. 1.67%, 5.00%, 27.50% and 25% of the sample households belong to large sized families in Mysuru,

Davangere, Kalaburagi and Vijaypur respectively. Majority of the rural household belong to small sized families.

Table 3: Distribution of rural households by education level

Sl. No.	Education level	Mysuru		Davangere		Kalburgi		Vijayapur		Pooled	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	Illiterate	20	16.67	28	23.33	42	35.00	37	30.83	127	26.46
2	Primary	37	30.83	31	25.83	33	27.50	22	18.33	123	25.63
3	Secondary	30	25.00	35	29.17	26	21.67	31	25.83	122	25.42
4	PUC	10	8.33	16	13.33	13	10.83	21	17.50	60	12.50
5	Degree	21	17.50	4	3.33	5	4.17	6	5.00	36	7.50
6	PG	2	1.67	6	5.00	1	0.83	3	2.50	12	2.50
	Total	120	100	120	100	120	100	120	100	480	100

Source: Primary Data

The educational qualification of the sample households is categorized as Illiterates, Primary, Secondary, PUC, Degree and Post-graduation. According to the analysis, 16.67% of the households belong to the category of illiterates from Mysuru, 23.33% of them belong to illiterate category from Davangere, 35% of them are from Kalaburagi and 30.83% of them are from the Vijaypur. 30.83% of the sample household belongs to the category of primary, 25.83%, 27.50% and 18.33% are from Davangere, Kalaburagi and Vijaypur respectively. 25%, 29.17%, 21.67% and 25.83% of the sample households belong to the category of secondary school from Mysuru, Davangere, Kalaburagi and Vijaypur respectively. There are about 8.33%, 13.33%, 10.83% and 17.50% of the sample household belong to the category of PUC from Mysuru, Davangere, Kalaburagi and Vijaypur respectively. Similarly, 17.50%, 3.33%, 4.17% and 5% of them belong to the category of degree from Mysuru, Davanagere, Kalaburagi and Vijaypur respectively. 1.67%, 5%, 0.83% and 2.50% of the households have pursued post-graduation.

Table: 4. Details of Sources of Irrigation accessed by sample households

Sl. No.	Particulars	Mysuru		Davangere		Kalburgi		Vijayapur		Pooled	
		No	%	No	%	No	%	No	%	No	%
1	Dug well	11	9.17	12	10.00	25	20.83	32	26.67	80	16.67
2	Borewell	35	29.17	38	31.67	76	63.33	73	60.83	222	46.25
3	Canal	64	53.33	65	54.17	16	13.33	13	10.83	158	32.92
4	Tank	10	8.33	5	4.17	3	2.50	2	1.67	20	4.17
5	Others (specify)	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6	Total	120	100	120	100	120	100	120	100	480	100

Source: Primary Data

The Table-4 elucidates the outcome of analysis of sources of irrigation accessed by sample households of the study. According to the table, from Mysuru; 9.17%, 29.17%, 53.33%, 8.33% households have access to water through well, borewell, canal and tank respectively, from Davangere; 10%, 31.6%, 54.17% and 4.17% get the water supply from well, borewell, canal and tank respectively, from Kalaburagi; 20.8%, 63.33%, 13.33% and 2.20% have access to water through well, borewell, canal and tank respectively, from Vijayapur; 26.67%, 60.83%, 10.83% and 1.67% have accessed water from well, borewell, canal and tank respectively.

Table-5 Average Size of land holdings by sample households

Sl. No.	Particulars	Mysuru		Davange		Kalburgi		Vijayapur		Pooled	
		Ac re	%	Ac re	%	Acr e	%	Acr e	%	Ac re	%
1	Irrigated owned land	3.98	72.50	4.97	75.76	6.31	38.74	5.21	36.43	5.12	48.01
2	Irrigated leased in land	1.04	18.94	0.92	14.02	0.63	3.87	1.41	9.86	1.00	9.38
3	Irrigated leased out land	0.03	0.55	0.10	1.52	0.33	2.03	0.23	1.61	0.17	1.62
4	Irrigated net operated area	4.99	90.89	5.79	88.26	6.62	40.52	6.46	44.76	5.12	48.01
5	Unirrigated owned land	0.54	9.84	0.84	12.80	8.04	49.36	7.18	50.21	4.15	38.93
6	Unirrigated leased in land	0.00	0.00	0.00	0.00	2.23	13.69	0.87	6.08	0.78	7.27
7	Unirrigated leased out land	0.04	0.73	0.04	0.61	0.59	3.62	0.12	0.84	0.20	1.85
8	Unirrigated net operated area	0.50	9.11	0.78	11.89	9.63	59.12	7.94	55.24	5.12	48.01
9	Total owned land	4.52	82.33	5.81	88.57	14.36	88.15	12.39	86.64	9.27	86.96
10	Total leased in land	1.04	18.94	0.92	14.02	2.86	17.56	1.53	10.70	1.59	14.89
11	Total leased out land	0.07	1.28	0.14	2.13	0.93	5.71	1.09	7.62	0.56	5.23
12	Total net operated area	5.49	100.00	6.56	100.00	16.29	100.00	14.33	100.00	10.66	100.00

From the Table-5, it is evident that 90.89% of the households have irrigated net operated area from Mysuru, 88.2% of the households have irrigated net operated area from Davangere, 40.5% of the households have irrigated net operated area from Kalaburagi and 44.76% of the households have irrigated net operated area from Vijaypur. 9.11% of the households from Mysuru have unirrigated net operated area, 11.89% of the households have unirrigated net operated area from Davangere, 59.12% of the sample households have unirrigated net operated area from Kalaburagi and 55.2% have unirrigated net operated area from Vijaypur.

Table-6(Annexure where **Area-** Million ha, **Production-** Million tones and **Yield-** kg./ha.) contemplates on the growth rate of area production and productivity of reference crops paddy, maize, ragi and jowar. The area utilized for the production of the paddy is 2.61, 3.47, 6.96 and 21.16 for growing paddy from Mysuru, Davangere, Kalaburagi and Vijaypur respectively with production of 2.63, 5.77, 11.47 and -18.27 and yield 1.10, 2.30, 4.51 and 2.89 respectively. The area utilized for the production of Ragi is 1.95, 0.04, 0.000 and 0.000 in Mysuru, Davangere, Kalaburagi and Vijaypur respectively with the production of -0.59, -1.74, 0.00 and 0.000 resulted in yield of 1.35, 2.30, 0.000 and 0.000. The area utilized for Maize is for about 2.64, 12.44, 4.51 and -14.78 from Mysuru, Davangere, Kalaburagi and Vijaypur respectively with the production of 3.50, 7.56, 6.08 and -7.72 resulted in the yield of 0.87, -4.88, 1.57 and 7.06. Similarly, the area of production of Jowar is 2.61, 3.47, 6.96 and -21.16 respectively from Mysuru, Davangere, Kalaburagi and Vijaypur with production of 2.63, 5.77, 11.47 and 18.27 with yield of 0.01, 2.30, 4.51 and 2.89.

Conclusion:

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