Original Research Paper   **Agricultural Science**

Predominant Farming Systems in Karnataka, India

KUMARA. O	AICRP-IFS, AHRS, Kathalagere, UAHS, Shimoga
H.G. SANNATHIMMAPA	AICRP-IFS, AHRS, Kathalagere, UAHS, Shimoga
BASAVARAJAPPA D.N	AICRP-IFS, AHRS, Kathalagere, UAHS, Shimoga
VIJAY S DANARADDI	AICRP-IFS, AHRS, Kathalagere, UAHS, Shimoga
AKMAL PASH	AICRP-IFS, AHRS, Kathalagere, UAHS, Shimoga

ABSTRACT

The rapid survey has been made to evaluate predominant farming systems in terms of gross income across three agro-climatic zones of Karnataka, India. A multi-stage random sampling method followed by a rapid survey revealed that farming community of all size classes intended to shift from their traditional rice based cropping system to more income generating systems like vegetables, livestock, plantation, spices and livestock based sub-systems in coastal region and Malnad zone, cereals and plantation based systems in southern-transitional zone. The farmers across all regions consciously invested water and inputs in cereals and plantation crops, fruits and vegetables to achieve greater return in comparison to rice and other agronomic crops. Despite of several odds, plantation was identified as predominant crop with good economic return in Malnad and Coastal region of the state. Livestock rearing was also on the rise along with fishery in the Coastal belt. This has been a welcome shift and diversification of farm enterprise. With gradual departure from rice and other cereals and shift favouring vegetables, livestock and fishery enterprises farm families have better productivity and remuneration per unit of land and might provide employment opportunity with less gestation.

INTRODUCTION

Identification of predominant farming systems is of critical importance for precise technological intervention and policy support. Farming system is described as a unit consisting of a human group (usually a household) and the resources it manages in its environment, involving the direct production of plant and/or animal products. Typology of farming system is dictated by

climate, production goals and culture of a society. This classification of the farming situations of developing regions may be as varied as available natural resource base, climate, landscape, farm size, tenure and organization, dominant pattern of farm activities and household livelihoods, which determine the intensity of production and integration of crops, livestock and other activities. Unfortunately, both in agricultural and social sciences, complexity and diversity have remained undervalued, and excluded from government statistics and policy framework. The heterogeneity across different regions as well as variation in different farms are influenced by a host of biophysical (e.g. climate, soil fertility, slope etc.) or socio-economic (e.g. preferences, prices, production objectives etc.) factors.

Developing a typology constitutes an essential step in any realistic evaluation of the constraints and opportunities that exists within farm households for forwarding appropriate policy interventions. The factors that define farm typology vary greatly from study to study and/or from region to region. These may be as diverse as agro ecological, socio-economic, managerial, infrastructural and broader issues of livelihoods. With lapse of time, agriculture has assumed commercial proportion, replacing its traditionally subsistence nature. Hence, farm typology delineation based on monetary income seems to be a pragmatic approach. This will also save resources by significantly

curtaining the volume of survey data. Keeping this view in mind, an attempt was made to identify and evaluate predominant farming systems of Karnataka state, India to find out the economically profitable farming systems, its contributions to overall livelihood of the farming community across three zones.

MATERIALS AND METHODS

As per the guidelines of Indian Institute of Farming System Research, Modipuram, Meerut, the rapid survey regarding evaluation of predominant farming systems across 3 agro-climatic regions of Karnataka carried out during 2012-13. Karnataka state has ten agro-climatic zones namely: North Eastern Transition Zone, North Eastern Dry Zone, Northern Dry Zone, Central Dry

Zone, Eastern Dry Zone, Southern Dry Zone, Southern-transition Zone, Northern-transition Zone, Hill Zone and Coastal Zone (fig. 1). From each zone one district and from each district two blocks selected randomly high productive and low productive in terms of existing cropping intensity taken for the study. From each district, four representative blocks and three villages selected randomly. Six representative farmers marginal, small, medium and large in terms of operational holding size were selected for the survey. Sampling scheme slightly served from the standard pockets where marginal-small farming communities predominant in nature. Overall marginal community (<1 ha.), small (1.0-2.0 ha.), medium (2.0 5.0 ha.) and large one (>5.0 ha.) have been framed purposively for the convenience of the survey work. Seventy two farming communities from each district and 144 from each NARP zone was surveyed, classified and categorized for the identification of the predominant farming system. Thus, a total of 432 farms surveyed.

The predominant farming system is the highest gross income received from a component. In identifying sub–system, component contributing highest income was followed by the component contributing next best income to the system and so on. The name of components in a given sub-systems has been put as per their contributions to gross income. For example, sub-system Rice + Maize + Vegetables' means that Rice contributes highest to the farm income followed by maize and vegetables. The following figure represents agro-climatic zones of Karnataka, India where zone 1 to 10 has been demarcated with different colours where, zone 7 denotes southern-transitional zone comprise Hassan (4 taluks), Chikamagalore (1 taluk), Shimoga (3 taluks), Mysore (3 taluks), Davanagere (2 taluks). Zone 9 represents Hilly zone represents Uttara Kannada (6 taluks), Belgaum (1 taluk), Dharwad (1 taluk), Haveri (1 taluk), Shimoga (4 taluks), Chikamagalore (5 taluks), Kodagu (3 taluks) and Hassan (1 taluk). Zone 10 represents coastal zone comprise Udupi (3 taluks), Dakshina Kannada (5 taluks), Uttara Kannada (5 taluks).

7. Southern-transitional Zone

9. Hilly Zone

10. Coastal Zone

Fig 1: Agro-Climatic Zones of Karnataka State

DATA
A pre-tested interview schedule was developed for the study. Apart from socio-economic parameters of the households, farm size, existing and emerging farming systems of the sample households, information on cost of cultivation and yield of different crops and price received by the farmers was included in the data collection instrument. The draft interview schedule was then pre-tested on 12 non-sampled respondents of each agro-climatic zone to incorporate necessary modifications in the instrument.

RESULTS AND DISCUSSION
Farm-size wise predominant farming systems across three agro-climatic zones of Karnataka was identified showed that Hilly zone was dominated by cereal based farming system (48.61%) followed by plantation (45.14%) and fruits and vegetables based systems (6.25%). Marginal and small farmers, dominant in this zone, adopted diversified farming system apart from growing traditional cereal crops. Southern-transitional Zone was dominated by conventional cereal-based farming systems (53.47%), followed by plantation based system (17%), and fruits and vegetables based systems (15.97%). In Hilly Zone, one of the high productivity zones of the state, 48.61 per cent households followed cereal based farming systems. Dairy was found to be the next popular sys-

tem adopted by the farming community. Coastal Zone was predominated by plantation based farming systems (44.44%). In many parts of this region, departure from traditional cropping pattern has been a trend for the last one and half decades mostly for enhancing income from fragmented land resources. Cereal based farming system was also predominant in the Coastal Zone (36.81%) of the state, which was known to be one of the problematic zones of the state with unfavourable water regime, topography, soil fertility and socio-economic condition of the farm families.

Table 1: Farm size-wise number of farmers having different farming systems in Southern-transitional Zone of Karnataka

Southern-transitional Zone 7: Davanagere, Hassan				
Farming Systems	Marginal	Small	Medium	Large	All farms
Cereal Based	28 (60.87)	23 (56.10)	13 (48.15)	13 (43.33)	77 (53.47)
Fruit & Vegetables Based	7 (15.22)	11 (26.83)	3 (11.11)	2 (6.67)	23 (15.97)
Plantation Based	3 (6.52)	3 (7.32)	9 (33.33)	10 (33.33)	25 (17.36)
Sugarcane Based	3 (6.52)	1 (2.44)	1 (3.70)	4 (13.33)	9 (6.25)
Livestock based	5 (10.87)	3 (7.32)	1 (3.70)	1 (3.33)	10 (6.94)
Total	46	41	27	30	144
Hilly Zone 9: Chikamagalore, Shimoga				
Cereal Based	18 (52.94)	22 (57.89)	15 (42.86)	15 (44.12)	70 (48.61)
Plantation Based	13 (38.24)	14 (36.84)	18 (51.43)	17 (50.00)	65 (45.14)
Fruits & Vegetables Based	3 (8.82)	2 (5.26)	2 (5.71)	2 (5.88)	9 (6.25)
Total	34	38	35	34	144
Coastal Zone 10: Udupi, Dakshina Kannada				
Cereal Based	22 (46.81)	20 (47.62)	7 (26.92)	4 (13.79)	53 (36.81)
Plantation Based	18 (38.30)	15 (35.71)	13 (50.00)	18 (62.07)	64 (44.44)
Livestock Based	7 (14.89)	7 (16.67)	6 (23.08)	7 (24.14)	27 (18.75)
Total	47	42	26	29	144

Figures in the parentheses indicates percent to total
Barring scarcity in irrigation water, livestock was identified as a predominant crop in coastal region with 18.75 per cent farm households following this system. Another problematic tract of the state is Coastal belt of Karnataka where high soil salinity results into poor agricultural production. Rainfed rice has been registered as the most predominant farming system in this region that covers around 37.0 per cent of the farm family, followed by plantation based sub systems (44%). The region is well connected to Mangalore and non-farm activities have a significant effect on socio-economic status and rural livelihoods of the farm families of the zone. This is not surprising since non-farm income has become a burgeoning reality of rural India especially for the smallholders and this has often become the largest source of rural farm income.

Farm size wise share of gross income received from different farming systems
Cereal based sub-systems existed across all the regions of the state, highest share being in the southern-transitional zone 43.13 per cent contribution to gross farm income from plantation based system. The share in Coastal saline zone was 74.67 per cent. This region suffered from climatic variability, topography and soil structure and was known to be a monocrop region, Rainfed rice being the sole crop cultivated. Next to cereals, livestock based farming systems existed in all the zones. Hill zone demonstrated highest share (68.88%) followed by cereals (51.95%) and fruits and vegetables (45.88%), Coastal (74.67%) and southern-transitional zone (43.13%). Sugarcane based sub-systems showed 29.91%

share in southern-transitional zone, where sugarcane and paddy were predominant crops. Pulse-based farming system existed in coastal belt of Karnataka. Livestock based farming system shared 46.31 per cent contribution to gross farm income in southern-transitional zone, while contribution of plantation based farming system was 43.13 per cent. Fruits and vegetables based farming systems were observed to have developed in almost all the zones of the state.

Table 2: Farm size wise share of gross-income received from different farming systems

Southern-transitional Zone 7: Davanagere, Hassan					
Farming Systems	Marginal	Small	Medium	Large	All farms
Cereal Based	40.87 (0.80)	46.10 (2.80)	28.15 (3.40)	33.33 (6.30)	37.11 3.33
Fruit & Vegetables Based	15.22 (1.88)	26.83 (2.55)	41.11) (4.55)	46.67 (5.55)	29.57 3.67
Plantation Based	16.52 (1.55)	17.32 (2.80)	65.33 (5.40)	73.33 (6.30)	43.13 4.01
Sugarcane Based	0.0 (1.85)	2.44 (2.90)	53.70 (6.55)	63.50 (6.66)	29.91 4.49
Livestock based	70.87 (2.80)	67.32 (2.75)	23.70 (5.60)	23.33 (6.55)	46.31 4.43
Hilly Zone 9: Chikamagalore, Shimoga					
Cereal Based	72.94 (1.25)	87.89 (3.80)	22.86 (6.40)	24.12 (8.30)	51.95 4.94
Plantation Based	18.24 (1.50)	16.84 (2.75)	75.43 (6.55)	85.00 (7.50)	68.88 4.58
Fruits & Vegetables Based	18.82 (1.90)	15.26 (3.50)	35.71 (7.60)	45.88 (8.25)	29.92 5.31
Coastal Zone 10: Udupi, Dakshina Kannada					
Cereal Based	76.81 (2.00)	87.62 (3.66)	10.92 (8.40)	12.79 (10.50)	30.71 6.14
Plantation Based	68.30 (2.50)	65.71 (3.75)	80.00 (7.50)	92.07 (9.55)	74.67 5.83
Livestock Based	64.89 (2.55)	76.67 (3.25)	53.08 (7.56)	34.14 (10.56)	57.20 5.98

Figures in the parentheses indicates respective average land holding size (ha.) of different size classes

Contribution to gross farm income was highest in Coastal (74.67%) followed by Hilly zone (68.88%). Fruit and vegetables based systems developed in Hilly tract of Karnataka (29.92% share), where orange was found to be the most profitable fruit in terms of economic return. Livestock based sub-system was observed in Coastal zone with a share of 57.20 per cent. Fishery dominated in the Coastal belt of the state exhibiting a 68.18 per cent share across all size classes of farm families. Plantation based systems were predominant in Hilly tract of Karnataka, coffee plantation being the highest in making monetary return to the gross farm income. Overall, a 68.88 per cent share of gross income received from the plantation-based farming systems in this zone. Coastal belt of the state is famous for Arecanut cultivation that contributed 74.67 per cent of the gross income from plantation based farming systems. Livestock based farming systems was found in southern-transitional zone (46.31% share). Cardamom, cocoa, black pepper and cumin being the significant contributors in Coastal region. It was the marginal and small farming communities, who showed tendency to diversify their predominant farming systems into cash earning systems for improving their livelihood status. This might be due to the pressing need of increasing farm income from small fragmented holdings. The number of small and marginal holders has increased in Karnataka and there is also evidence of increased crop diversity on fragmented lands in the state.

CONCLUSIONS
Across all agro-climatic zones of Karnataka, farming community of all size started to shift from their traditional rice-based cropping system to more income generating systems based on fruits, vegetables, livestock, plantation, spices, fishery, sheep,

rabbit, cut flowers, poultry, vermicompost, apiary and piggery. Plantation in the Coastal belt of the state demonstrated a stronger departure from rice-based farming than other zones, and that was most pronounced among marginal farmers. Small and marginal farmers were still preoccupied with their land with little off-farm shift in livelihoods. Medium and large farmers had already diversified into other occupations, and contrary to belief, farming might have become a secondary occupation for them. Among the crops, rice showed a diverse shift to several sub-farming systems. Fruits and vegetables were on the rise across agro-ecological zones and size categories. Livestock, fishery, piggery and plantation were incorporated in specific farming systems of specific areas. This scenario is welcome. Farmers across all regions had perhaps become largely conscious that water and other inputs had a greater return when invested in fruits and vegetables compared to rice and other agronomic crops. Livestock was also on the rise along with fishery. This also is a welcome shift embodying diversification in enterprises. With gradual departure from rice and other cereals and shift favouring fruits and orchard enterprise, and livestock and fishery, better productivity and remuneration per unit of land is imminent and this might be providing enhanced opportunity of employment with less gestation.

REFERENCES
1.   Bagchi, B. D., S. B. Roy, W. M. H. Jaim and Hossain, M. 2012. Diversity, spatial distribution, and the process of adoption of improved rice varieties in West Bengal, Adoption and diffusion of modern rice varieties in Bangladesh and eastern India. IRRI, Philippines, pp 31-44.

2.   Chambers, R., Pacey, A., Thrupp, L.A. 1989. Farmer first: farmer innovation and agricultural research, London: Intermediate Technology Publications.

3.   Dixon, J., Gulliver, A., Gibbon, D. 2001. Farming systems and poverty: improving farmers' livelihoods in a changing world. Rome: FAO.

4.   FAO 1990. Farming Systems Development: Guidelines for the conduct of a training course in Farming Systems Development. Rome, Italy.

5.   Goswami, R. 2007. Understanding farmer-to-farmer communication within the Sustainable Rural Livelihood framework. Thesis Ph.D, Bidhan Chandra Krishi Viswavidyalaya, Department of Agricultural Extension, West Bengal, India.

6.   Joshi, P. K., A. Gulati and R. Cummings Jr. 2007. Agricultural Diversification and Small holders in South Asia. Academic Foundation, New Delhi, India.

7.   Mehta, R. 2009. Rural livelihood diversification and its measurement issues: focus India. Wye city group on statistics on rural development and agriculture household income, second meeting at FAO HQ, Italy, Rome, 11-12 June 2009.

8.   Vyas, V. S. 2001. Agriculture: second round of economic reforms, Economic and Political Weekly, 36: 829-836.