Constraints Analysis in Integrated Farming System in Select Agro-Climatic Zones of Karnataka State

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A B S T R A C T

Indian Farming system comprising multi-faceted dependence of nature, constraints are inevitable, Constraints in the system of agriculture are natural, which requires utmost care, caution and prevention. An understanding of these constraints will pave way in decision making by every farmer for the prospects and policy maker for further development. Hence an attempt is made to analyse the constraints of Integrated farming system (IFS) in select Agro-Climatic Zones of Karnataka State. The constraints expressed by the respondents in the order of severity were ranked using Garrett ranking technique which is used to find out the most significant constraint to be addressed in the order of priority. The present study was conducted during 2018-19 in the representative districts of selected five agro climatic zones of Karnataka State namely Dharwad-Northern Transitition zone, Tumkur - Central dry zone, Mandya-Southern dry zone, Shimoga-Hilly zone and Udupi-Coastal zone. The perusal of results from the present study revealed the major constraints in order of importance, as expressed by the respondents on the basis of mean score value which included: Lack of remunerative prices for farm produce (84.00), long working hours (76.94), High cost of inputs to take up different farm enterprises (76.84), Lack of marketing facilities and exploitation by middlemen at local level (76.69), Management of subsidiary enterprises like dairy, sheep and goat units. (74.71), Lack of proper access to information and extension services (72.77), Scarcity and high cost of labour (71.78), Monsoon fluctuations affecting production levels. (66.26), Natural resource management, in terms of water conservation and soil health (63.36), Less involvement of Youth in farming (59.66), Problems of wildlife menace, pests & diseases (58.83) and Cultural incompatibility in adopting Livestock a component in integrated farming system (58.49). The policy decisions and measures of Government towards extension initiatives for establishing model farms and organizing the awareness and training programmes on integration of different farm enterprises in one or two locations of each Panchayat union may enable the farmers of that locality to gain first-hand knowledge about various aspects of integrated farming system and help them to overcome the constraints of integrated farming system.

Introduction

In Indian agriculture scenario, income through arable farming alone is insufficient for livelihood security of majority of the marginal and small farmers. Due to declining per capita availability of land in India, there is meagre scope for parallel expansion of land for food production thereby leading to the only possibility of vertical expansion by integrating precise farming components that need lesser space and time to make sure periodic income to farmers (Singh and Burark. 2016). Integrated Farming System (IFS) integrates primarily mono-cropping with allied enterprises like – dairy, horticulture, sheep and goat rearing, fishery, poultry, mushroom production, sericulture and biogas production to enhance the income and improve the quality of living of farmers (Bhutia, *et al.,* 2017). Integration of varied enterprises ensures recycling of farm residues, optimum use of obtainable resources, increase employed opportunities, minimization of risks and uncertainties and in particular to extend the farm income (Pushpa. 2010). IFS practiced as a mixed farming system where the livestock component is maintained on agricultural waste products while the animal is employed to cultivate the soil and supply manure to be used as fertilizer and fuel depicts the symbiotic relation and bio-resource flow between two or more enterprises (Jayanthi *et al.,* 2000).

However, the farm is viewed in holistic manner and farmers are subjected to socioeconomic, biophysical, institutional, administrative, technological constraints in production, protection and marketing aspects. Therefore, it is pertinent to study the constraints of prevailing integrated farming systems faced by farmers in select agro-climatic zones of Karnataka.

Karnataka, a State of agrarian economy and overall development of the State is mainly depending on the growth and development of agriculture and allied sectors, as well as 61.43% of the population live in the villages, with 71.00% of total work force is engaged in agriculture. A large part of the state practice rainfed agriculture and also the State is a victim of frequent droughts in the recent past. There is a wide-spread concern about distress in agriculture and subsiding incomes of farmers. According to a report by the National Crime Records Bureau among the states with the highest incidence of farmer suicide in 2015-16, Karnataka State stands at third place in the country due to numerous reasons (https://en.wikipedia.org/wiki/Farmers%27_su icides_in_India). Also it is noticed that there is a wide gap in adoption of scientific and precision agriculture in the State which calls for the effective implementation of integrated farming systems in which contribution from the dairy sector plays the major role under different agro climatic zones for enhancing income and employment generation round the year.

Materials and Methods

Karnataka State comprises ten agro climatic zones and spread across thirty districts. Five major Agro-Climatic Zones and representative districts from each zone were selected for the present research study through random sampling method, namely Dharwad-Northern Transitition zone, Tumkur - Central dry zone, Mandya-Southern dry zone, Shimoga-Hilly zone and Udupi-Coastal zone during 2018-19; with an appropriate justification of integrated farming system being predominant practice in these selected districts. Further, from each district, two taluks (blocks) were selected purposively and 50 farmers practicing integrated farming system were selected as respondents through stratified random sampling method, with the total sample size of

250 farmer respondents. A well-structured, standardized, pretested interview schedule was used as tool for data collection in research and pilot tested in the field conditions, on 40 non sample respondents. The collected data was tabulated, scored, and analyzed using Garrett ranking technique (1969).

Garrett's ranking technique

The orders of severity of constraints given by the respondents were converted in to rank by using the Garrett's ranking technique, the order of constraints into numerical scores. It facilitates in finding out the most significant factor which influences the respondent in constraint analysis (Dhanavandan. 2016).The major advantage of this technique as compared to simple frequency distribution is that, constraints are ranked based on order of importance as perceived by respondents (Zalkuwi *et al.,* 2015). In the first step major constraints in Integrated Farming System was prepared by discussing and consulting the experts, researchers, other relevant professionals in the study area, in the field of extension education and with focused group discussion with progressive farmers during preliminary research survey. In the second step as per Garrett ranking method, the respondents were asked to rank the twelve factors (constraints) identified for the purpose of this study in order to know their preference in the selection of constraints in the order of severity as faced by the respondents. In the third step, with the help of Garrett and Woodworth (1969) table, the percent position value estimated, is converted into scores (Garrett value). In the fourth step, each rank with the Garrett's value, was obtained as scores. In the fifth step, for each factor (constraint) the scores of each individual were added and total value of scores and mean values of score is calculated and the factors having highest mean value are considered to be the most important constraints.

The ranking given by the respondents is depicted in the Table 1. The outcome of ranking was converted into score value in the third step with the help of the following formula:

$$\text{Percent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the ith variable by jth respondents

N_j = Number of variable ranked by jth respondents

Results and Discussion

The constraints faced by the respondent-farmers in the areas of production, plant protection, marketing and overall management related to integrated farming systems were assessed in the study area in holistic manner considering socioeconomic, biophysical, institutional, administrative and technological constraints. An attempt is made to analyze various constraints prevailing in integrated farming systems of select agro-climatic zones of Karnataka. The orders of severity of constraints given by the respondents were converted in to rank using Garrett rank technique which is used to find out the most significant factor which influences the respondent.

The perusal of results from the Table1 revealed the major constraints faced by the IFS farmers in general in all the five selected zones of Karnataka in order of importance by allotting them ranks, as expressed by the respondents.

The results of Table 2 revealed the major constraints in order of importance and severity, as expressed by the respondents on the basis of mean score value such as: Lack of remunerative prices for farm produce (84.00)

ranked first, long working hours (76.94) in second rank, High cost of inputs to take up different farm enterprises (76.84) in third rank, Lack of marketing facilities and exploitation by middlemen at local level (76.69) in fourth rank, Management of subsidiary enterprises (74.71) in fifth rank, Lack of proper access to information and extension services (72.77) in sixth rank, Scarcity and high cost of labour (71.78) in seventh rank, Monsoon fluctuations affecting production levels (66.26) in eighth rank, Natural resource management, in terms of water conservation and soil health (63.36) in ninth rank, Less involvement of Youth in farming (59.66) in tenth rank, Problems of wildlife menace, pests & diseases (58.83) in eleventh rank and Cultural incompatibility in adopting Livestock as an integrated farming system component (58.49) in twelfth rank.

The ranking of constraints could be utilized for prioritization of constraints to formulate immediate measures on priority basis to address the specific constraint.

Even though ten ranks were opted for each constraint, all the constraints had equal importance and in most of the integrated farms of the study area majority of the farmers were experiencing one or the other of these constraints irrespective of their rank.

The rank order and severity of constraints on the basis of mean score value faced by the IFS farmers in general in all the five selected zones of Karnataka is depicted in Figure 1.

Lack of remunerative prices for farm produce and high price fluctuations

This constraint was ranked first, unanimously by all the respondents with mean score value of 84.00, because in the recent years rainfall was serious problem in Karnataka State, high rainfall in the districts of Shimoga and Udupi whereas deficit in case of Tumkur and

Dharwad districts and moderate in Mandya district. An unequal distribution of rainfall affects agricultural operation which in turn leads to price fluctuation for produce with farmers deprived of remunerative prices. Low prices for silk cocoons in the markets of Ramnagara, had adversely affected sericulture following farmers of Mandya and Tumkur districts in the last two years. The findings of the present study were similar to that of Kowsalya (2017), Gopika (2018), Shivaji (2014) and Singh (2016). Also it was observed that the prices for milk varied from Udupi district where farmers are receiving Rs.33.00-35.00/-per litre whereas, Tumkur district farmers were receiving Rs.27.00per litre; this might be due to lack of contribution from the cooperative societies of the districts under study. Hence the role of cooperatives and its effective management in revenue generation plays a significant role.

Longer working hours

The respondents practicing different integrated farming systems in all the five agro climatic zones were facing the difficulty in managing different enterprises due to the need of prolonged working hours and labour work, involved in intercultural operations, crop residue recycling, managing resources, maintaining special infrastructure for different enterprises, keeping unpolluted house environment, preventing pest and diseases, difficulty in animal care during peak agricultural season, fulfilling water requirement, avoiding damage of agricultural crops by wild animals. Two third of the farmers expressed longer working hours which needs constant look up on farm activities as the major constraint with mean score of 76.94.

These observations derive support from the findings of Kowsalya (2017), Bhutia (2017) and Singh H (2016).

High cost of inputs to take up different farm enterprises

Non availability of quality inputs in required quantity and at required time, with high cost is the major problem in integrating different farming systems.

Lack of suitable farm implements and machineries, inadequate irrigation facilities (Tumkur and Dharwad districts), lack of custom hiring centres, lack of awareness about subsidies on farm inputs, irregular power supply, infrastructural needs to take up dairying, poultry or aquaculture in the farms were the constraints with mean score value of 76.84 faced by majority i.e. 71.00%. The results are in line with the findings of Gopika (2018) and Shivaji (2014).

Lack of marketing facilities and exploitation by middlemen at local level

A significant per cent (69.00%) of IFS farmers with mean score value of 76.69, expressed that lack of knowledge about prevailing market price, high marketing costs, untimely payment of commodities sold in the market, cheating by middlemen in marketing, constraints in disposal of produce, very low share of profit to the producer, problem in transportation to reach market with the bulk produce, lack of exclusive markets and lack of storage facilities for perishable agricultural commodities, non-availability of assured market for the timber from agro forest trees and regulated marketing system for sale of goats and sheeps were the important marketing constraints.

Difficulty in sale of flowers, fruits and vegetables on small scale were due to inefficient marketing system in the study areas as expressed by the respondents. Similar findings were communicated in the studies of Haneef (2019), Bhutia (2017), Kowsalya D (2017) and Singh H (2016).

Management of subsidiary enterprises: Dairy, Sheep and Goat Units

More than half of the respondents (55.00%) with mean score value of 74.71, expressed that efficient and balanced management of different enterprises in integrated farming system is a cumbersome work.

In case of Dairy farming, the constraints varied in districts which included low productivity of indigenous cattle (in Shimoga and Udupi districts), non-availability of green and dry fodder (in Tumkur district), inadequate veterinary facilities, high cost of feeds, concentrates and fodders, inadequate knowledge on balanced feeding and lack of organized milk marketing facilities in villages, lack of knowledge on fodder crop cultivation, improper housing facilities, problems of heat detection and disease management of cattle affected effective management of dairy farming. In case of Sericulture in Mandya and Tumkur districts, fluctuation in the price of cocoon, lack of knowledge on identification of disease symptoms, lack of training on silkworm rearing, lack of technical facilities and technical assistance, inadequate marketing facilities were the major constraints.

With respect to poultry, goat, sheep and fish farming; lack of credit facilities, lack of knowledge on preparation of feeds, high cost of feeds, lack of training on livestock health management and lack of technical assistance were the major perceived constraints.

The present results might be due to the fact that farmers were not in frequent contact with the Veterinary Institutions or related agency for scientific Livestock or dairy management until unless there are issues of diseases in livestock/cattle's. The research findings were in correspondence with the studies of Bhutia (2017), Singh H (2016), Shivaji, D. (2014) and Shwetha B M (2014).

Lack of proper access to information and extension services

Lack of communication of technical know-how to the farm families and untimely diffusion of the latest technologies due to longer distances between farm families (in Shimoga and Udupi districts), even though many training programmes are being offered by different stakeholders to farmers, many of them are of same topics and areas, like scientific dairy farming, calf rearing, fodder cultivation, while farmers are more interested to attend training programmes in the area of disease management and low cost nutritive feed production etc. Lack of extension services and poor stakeholder linkages in dissemination of agricultural services (in Dharwad and Tumkur), lack of capacity building programme, non-availability of clinical services for livestock, lack of effective live and timely demonstrations to prove the worthiness of the new technologies, non-availability of extension personnel and lack of trained extension personnel were identified as the major constraints by fifty three percent of farmers with mean score value of 72.77. The findings of Kowsalya (2017), Pushpa (2010), Jayanthi (2000), Sharma (2008) were in line with the present study.

Scarcity and high cost of labour

Nearly fifty per cent of the IFS farmers with mean score value of 71.78, expressed that efficient integration of various enterprises in a farm involves high labour work, which is major constraint since labour force in agriculture is depleting due to migration towards cities, and other rural employment programme opportunities. Hence it is highly difficult for the farmers to take the risk of maintaining three to four enterprises which requires high manpower and maintenance round the year. Due to enormous scarcity and high cost of labour (ranging from Rs. 500- Rs.

600/day) in Shimoga, Udupi and Tumkur districts, has forced many of the farmers to opt only two enterprises viz., Crop and dairy. The findings matches with the research results of Gopika (2018), Kowsalya (2017) and Shivaji (2014)

Monsoon fluctuations affecting production levels (Drought, heavy rainfall, flood)

Around one fourth of respondents with mean score value of 66.26, felt that unpredictable monsoon fluctuations pose indispensable threats to agriculture. Heavy rainfall in Shimoga, Udupi and Mandya districts have led to loss of production of coconut, arecanut, coffee, rubber and cocoon rearing and farmers reported that the yield loss from hail storm during rainfall, and drought situation in study areas of Tumkur and Dharwad districts in the last two years have led to lower yield of groundnut, coconut, cotton, chilli, soyabean and even reduced the yield of cattle due to water and fodder scarcity. Also lack of awareness on various crop insurance schemes such as Pradhan Mantri Fasal Bhima Yojana, farmer is solely facing the burden of crop loss due to monsoon fluctuations with mounting stress pushed to suicides under great loss.

Natural resource management for water conservation and soil health

Natural resource management plays a pivotal role in integrated farming system which helps in sustainable bio-resource flow. The practices viz., fodder preservation, farm waste management, prevention of soil erosion & nutrients loss due to heavy rains, mulching with farm bio waste, livestock and kitchen wastes, rain water harvesting techniques with farm ponds or Krishi Hondas (Ponds) in order to keep ground water recharged, biogas and vermi composting, helps in soil health conservation. Around forty three per cent with mean score value of 63.36, lacked technical

know-how and scientific management of natural resources in farm.

Less involvement of Youth in farming

Majority of the farmer respondents (70.00%) currently practicing integrated farming systems in the study area were in the middle age category (36-60 years), depicting the less interested youth drifting away from farming as it includes more of heavy labour and hardship. With the prevailing mindset on current crisis of low income, price fluctuations in farming, youngsters migrate to cities in search of jobs and also practicing agriculture among youth is a discouraging factor which makes denial of marriages and is considered as the lowest job in the villages. All these factors have led to less interest among youth to involve in farming expressed by one fourth of the IFS respondents with mean score value of 59.66.

Problems of Wildlife Menace, Pests & Diseases

In Udupi and Shimoga districts, the crop loss is high due to wild boar attacks on the standing crops. Farmers often complain that, there is reduction in area of production of paddy, sugarcane and horticultural crops like fruits and vegetables due to wild animal menace. Also the farming systems having more animal integration had more fly nuisance, damage to agricultural crops, and polluted living environment. The problem of pest and disease attack was more due to heavy rains during rainy season. Hence majority of the farmers restricts themselves to grow plantation crops with limited combination of livestock.

Cultural incompatibility in adopting Livestock as an IFS component

Most of the farmers of Dharwad and Udupi district don't go for integrating different

systems because there is a hesitation in following integrated farming systems especially combining livestock such as poultry, piggery, fishery, goatary and sheep farming as an integral part of farming systems due to cultural incompatibility as majority of the people belongs to vegetarian community and are facing the problem of income crunch during the low prices for agricultural produces in the market.

District wise Constraints in Integrated farming system.

An effort has been made to highlight the specific and important constraints faced by the farmer respondent's districts under study of five different agro climatic zones as presented in Tables 3 to 7 along with the suggestions expressed by different stakeholders and farmer respondents of the study.

Specific Constraints observed in Integrated farming system of Mandya District

The results depicts that uneven release of Cauvery river water through channels which is the major source of irrigation in Mandya district had led to water logging and crop loss in the fields. Also few respondents expressed the problem of poor quality milk production due to which cooperatives are paying very low price and farmers have requested office bearers for farm visit and to assess the quality and method of milk production but it has not been done effectively in all the households due to biased work of officials. And most of the farmers grow sugarcane in the district, all of them face the problem of trash management, harvesting and marketing due to labour scarcity. As well as non-adoption of improved mechanized implements and following of conventional methods of paddy cultivation and not going for SRI cultivation of paddy has resulted in lower yields. Due to heavy rains in the research study year there

was found to be moisture in the silk cocoons which fetched them the lower price in the market due to poor quality, so the major livelihood income was hit by the climatic variation.

Indicative Suggestions from the study

Fruits and vegetable cultivation along with scientific dairying in conjunction with feed and fodder development has to be focused from agriculture developmental agencies in the district. Watershed development for augmenting surface, groundwater leaching and to avoid water logging problem.

Development of orchards - mango, cashew, jack and sapota can be enforced in large scale. Need to focus on Water-saving irrigation methods and cost-saving planting methods for irrigated ginger and turmeric. Promotion of millets and small onions cultivation is profitable. A rural hatchery unit of capacity from 202- 1000 eggs can be well established at farmer's door step/ community based group to meet the local demand of chicks & returns.

Specific Constraints observed in Integrated farming system of Udupi District

In case of Udupi district the agricultural crop loss is high due to wild boar attacks on the crops. Hence farmers restricts themselves to grow plantation crops only in which they faces the problem of pest and disease attack coupled with heavy rainfall during rainy season leading to loss of produces'. Almost ninety per cent of the farmers practicing agriculture are found to be medium aged and old aged farmers and hardly ten per cent of youths are involved in farming threatening the scope of agriculture future in Udupi district. Also due to decent income earned though agriculture system, farmers do not pay much attention to livestock due to lack of complete knowledge on commercial dairy practices.

Indicative Suggestions from the study

There is a great scope for Rain-shelter horticulture and value addition for export from the district. Creating awareness on Management of soil acidity and associated problems has to be focused to avoid deterioration of soil fertility. Forest department has to forward the policies for Management of man-animal conflict to prevent the huge loss created by wild animals in agricultural fields. Improve the productivity of livestock through focusing on indigenous breed like Malnad Gidda whose milk has high demand in the market for its medicinal value. Since Udupi is a coastal district there is wider scope for development of Brackish water aqua culture; backwater cage culture; bioflock method of prawn culture. Also the soils of Udupi is very much suitable for high density cashew plantations where few farmers are experimenting pepper and cashew intercultivation which is fetching them higher income than growing pepper with arecanut/coconut and nowadays Areca sheath is being used as source of dry fodder apart from manure in the fields. Improved farm machineries, streamlined extension linkage are the need of the hour to cope with these challenges.

Specific Constraints observed in Integrated farming system of Dharwad District

Dharwad being the northern transitional zone, rainfall pattern is unpredicted and groundwater level also found to be drained.

This situation has led low production levels and due to poor linkage among different stakeholders, the required technologies like crop harvesters, tillers, IPM, INM techniques, improved varieties have not yet reached the farmer doorsteps. Heavy Soil/ Black soil type makes it difficult to grow vegetable crops during non-rainy season.

Table.1 Ranking of constraints according to farmers' response.

N=250

Sl. No	Problems	Rank												N
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Lack of remunerative prices for farm produce and high price fluctuations	250	0	0	0	0	0	0	0	0	0	0	0	250
2	Longer working hours	165	25	18	15	12	10	5	0	0	0	0	0	250
3	High cost of inputs to take up different farm enterprises	179	17	15	12	6	5	3	3	2	5	3	0	250
4	Lack of marketing facilities and exploitation by middlemen	170	24	12	13	9	8	5	6	3	0	0	0	250
5	Management of subsidiary enterprises like dairy, sheep and goat units.	140	35	28	15	13	7	5	4	2	0	0	0	250
6	Lack of proper access to information and extension services	134	37	16	15	11	10	8	6	6	5	2	0	250
7	Scarcity and high cost of labour	123	30	27	19	16	12	8	6	3	3	2	1	250
8	Monsoon fluctuations affecting production levels. (Drought, heavy rainfall, flood)	70	50	40	15	11	13	17	24	3	2	1	4	250
9	Natural resource management, in terms of water conservation and soil health	108	17	11	9	6	7	25	20	12	15	10	10	250
10	Less involvement of Youth in farming	62	28	34	26	14	11	6	9	14	17	13	16	250
11	Problems of wildlife menace, pests & diseases	50	40	20	10	25	23	15	17	12	13	11	14	250
12	Cultural incompatibility in adopting Livestock as an integrated farming system component	48	30	27	25	25	19	16	13	13	11	12	11	250

Table.2 Ranking of constraints according to their mean score value.

N=250

SL No	Constraints	Mean Score	Ranks
1	Lack of remunerative prices for farm produce and high price fluctuations	84.00	1
2	Longer working hours	76.94	2
3	High cost of inputs to take up different farm enterprises	76.84	3
4	Lack of marketing facilities and exploitation by middlemen	76.69	4
5	Management of subsidiary enterprises like dairy, sheep and goat units.	74.71	5
6	Lack of proper access to information and extension services	72.77	6
7	Scarcity & high cost of labour	71.78	7
8	Monsoon fluctuations affecting production levels (Drought, heavy rainfall, flood)	66.26	8
9	Natural resource management, in terms of water conservation and soil health	63.36	9
10	Less involvement of Youth in farming	59.66	10
11	Problems of wildlife menace, pests & diseases	58.83	11
12	Cultural incompatibility in adopting Livestock as an integrated farming system component	58.50	12

Table.3 Specific Constraints observed in Integrated farming system of Mandya District

n=50

Mandya District	Mean Score	Rank
1. Uneven Irrigation: Water Logging	72.23	1
2. Problem with the trash management in case of Sugarcane	55.60	2
3. Sericulture: Very low price for the cocoons in the current year and lack of knowledge on disease management in Silkworm rearing.	50.00	3
4. Poor quality of milk leading to low prices	46.87	4
5. Conventional methods of paddy and sugarcane cultivation	43.30	5

Table.4 Specific Constraints observed in Integrated farming system of Udupi District

n=50

Udupi	Mean Score	Rank
1. Wild boar attack (Unable to grow vegetables and fruits)	68.35	1
2. High rainfall coupled with soil erosion	65.00	2
3. Very low participation of youths in agriculture	63.37	3
4. Lack of knowledge on commercial dairy farming and fish farming technology	41.12	4
5. Selling of agricultural products to private companies/ middlemen due to improper logistic modes	40.25	5

Table.5 Specific Constraints observed in Integrated farming system of Dharwad District

n=50

| Dharwad District	Mean Score	Ranks
1. Low farm mechanisation	80.23	1
2. Transitional rainfall	76.90	2
3. Heavy Soils- Not feasible to grow vegetable crops	54.30	3
4. Weak linkage among Stakeholders	48.95	4
5. Cultural Incompatibility to adopt subsidiary occupations and lack of knowledge on cattle disease management	30.65	5

Table.6 Specific Constraints observed in Integrated farming system of Shimoga District

n=50

Shimoga	Mean Score	Rank
1. Lack of water conservation measures for summer season and leaching loss of nutrients and landslides due to heavy rains	82.36	1
2. Migration of Youths to cities	71.44	2
3. Risk of rubber drying during heavy rainy season	62.00	3
4. Lack of Registered and recognized Channel to promote the Malnad gidda cow milk and it's by products at high prices.	60.50	4
5. Wild boarers attack on paddy, vegetable and fruit crops.	55.70	5

Table.7 Specific Constraints observed in Integrated farming system of Tumkur District

n=50

TUMKUR	Mean Score	Ranks
1. Drought Prone area-Scarcity of water	83.46	1
2. High rate of migration- No youths in farming	80.32	2
3. Decreasing livestock population	61.91	3
4. Weak linkage among Stakeholders	60.00	4
5. Lack of mechanisation and management practices in groundnut and pigeon pea	56.38	5

Fig.1 Ranking of constraints according to their mean score value.
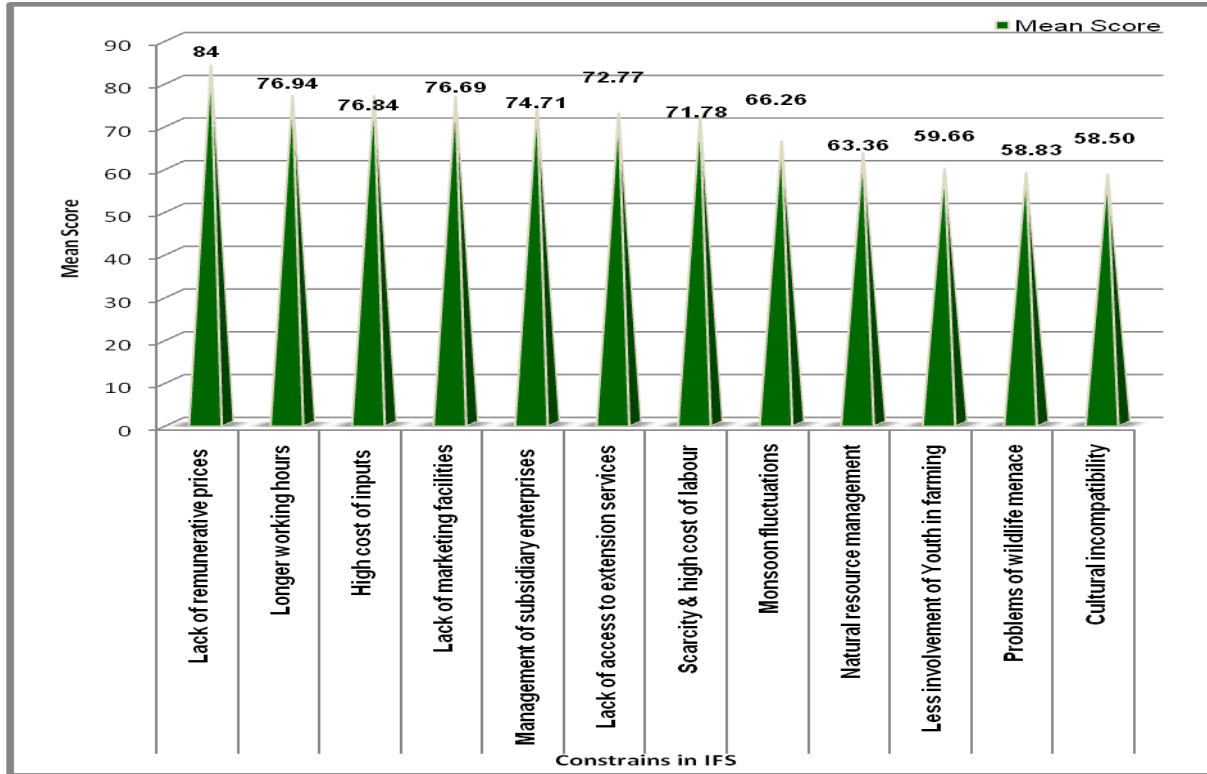
Also due to less linkage of farmers with scientific livestock community in the district, they lack scientific rearing of cattle's in the village. Most of the farmers of Dharwad district don't go for integrating different systems because there is a hesitation as well as disinclination in following integrated farming systems especially combining livestock such as poultry, fishery, piggery, goatery and sheep farming as an integral part of farming systems in the most parts of Dharwad district due to cultural incompatibility and since majority of the farmers of that region are vegetarians, they show reluctance in following these systems and are restricted to one or two enterprises.

Indicative suggestions from the study

Development of sheep, goat, poultry and fodder/pasture production has a greater scope along with Dharwad emmi (buffalo) and cattle rearing. Creating awareness on farm mechanization has to be emphasized by research institutes since farmers are mostly depended on manual and laborious works in the district. Also cluster wise establishment of custom hiring centers by Government of Karnataka will be a change maker strategy in the district as there is less initiative on this. There is need for Promotion of intercropping in mango and sapota orchards with legumes and vegetables, Promotion of exotic vegetables for export and Recirculatory aquaculture using minimum water and area. Promotion of seed production has a great scope. Watershed development for soil and water conservation though Gram panchayats.

Specific constraints observed in integrated farming system of Shimoga District

Due to heavy rains during rainy season, there is water logging problem, difficulties in drying of the rubber and loss of top soil and nutrients

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had become major problem. In order to include indigenous Dairy as the major enterprise, farmers need registered and recognized Channel to promote the Malnad gidda milk and it's by products at high prices. Farmers of Shimoga district often complain that there is reduction in area of production of paddy, sugarcane and horticultural crops like fruits and vegetables due to wild animal menace (wild boars and monkeys). Also the farming systems having more animal integration had more fly nuisance, damage to agricultural crops, and polluted living environment.

Indicative suggestions from the study

As farmers of Shimoga district practice multi stage cropping pattern, there is scope for Promotion of hi-tech horticulture and exotic fruits, and orchids. Also there is huge scope for promoting agro-dairy tourism amidst beautiful Western Ghats where tourists can be attracted easily. There is need for management of soil health in low lands or valley areas. Effective management of animal menace is the need of hour. Also Promotion of aquaculture in seasonal water bodies is needed. Pineapple fruit residue silage as source of green fodder can be promoted in the district.

Specific constraints observed in integrated farming system of Tumkur District

The Study area of Tumkur district was severely drought hit leading to high scarcity of water. It is directly affecting the agriculture system as well as livelihood of the farmers leading to high rate of migration from villages to cities in search of jobs. Due to scarcity of green fodder, water sources and excess heat stress during summer farmers are facing the problem in management of dairy animals and there is declining trend in the population of livestock.

Indicative suggestions from the study

Dairy, Small ruminant and poultry production can be enhanced among small and marginal farmers through credit or financial support. Soil and moisture conservation and Rain Water Harvesting through watershed approach has to be improved. Dry land horticulture (mango, sapota, pomegranate, amla, custard apple, cashew and medicine/aromatic plants) and alternate land use systems- agro forestry, horti-pasture, agri-horti, silvi-pastures can be promoted cluster wise. Since the linkage index among the Tumkur district farmers and other stakeholders is very weak, it is suggested to establish farmer producer organizations (FPO's) or famer cooperatives based on commodities or for agro processing so that it generates profit in marketing the agricultural produces' as a whole through effective marketing linkages. There is need for large scale production of short duration crops: green gram, sesame, onion, and groundnut. Creating awareness on Silage making & Azolla units for meeting fodder crisis can be done. Also promotion of efficient intercrops in coconut plantation and of Mango + Cowpea has to be focused. Enhancement of Dryland horticulture (amla, pomegranate,) which are best suited for dry spell/ drought hit areas has to be focused.

To overcome the above challenges/constraints faced by IFS farmers, following Strategic suggestions were evolved considering the opinions of farmer respondents as well as different stakeholders in the study area.

The crop along with Dairy is the first choice of the farmers as an integral part of their farming system as it is being practiced by cent percent of respondents. Hence focused efforts for promoting dairy sector by State as well as central Government initiatives to enhance the livelihood security of small and marginal farmers.

Promotion of Community farming in the areas of scarcity of labour, to reduce longer working hours in farms and also enhances sustainability and group dynamics among farmers at grass root level.

Focus areas for each stakeholder need to be demarcated and assigned as guidelines from government initiative to avoid duplication of activities with regular monitoring and follow up by research and extension system.

Commercial dairy practices with advanced technologies, creating awareness through application of ICT tools, Internet of Things and mass media in Transfer of Technology of Integrated Farming System to overcome the problem of less involvement of youth and to attract the youth towards agriculture and dairy farming.

Timely sanctioning of quality agricultural inputs, irrigation facility, water harvesting, moisture conservation technologies and heavy farm implements &machinery facilities in field at subsidised cost through Raitha Samparka kendras (RSK), Farmer producer organizations and custom hiring centers at the village level to cope up the problem of high cost of agricultural inputs, machineries and ease of marketing.

Creating awareness on crop insurance schemes (PM Fasal Bheema Yojana) and effective implementation to withstand the losses due to monsoon fluctuations.

Establishment of small scale enterprises and promotion of Agro-Dairy-Horti Tourism through P-P-P mode (Public Private Partnership) to create employment ventures in agriculture for unemployed youth.

There is a need to stress on the optimal blend between manpower and technology based extension, as the ratio of number of operational holdings per extension official is very huge i.e. 2428:1 in the Karnataka State (DFI Committee report, 2017). Hence creating a common platform at different levels for different extension service providers–public, private, NGOs, extension agents to disseminate advance technologies of agriculture in farmers' fields would facilitate the narrow-down of the wider gap.

State Agriculture department should provide effective marketing facilities at village level along with provision of training on grading and packaging of the horticultural crops to farmers in order to avoid intervention of middlemen and marketing distress.

Organized milk procurement system should be built at Panchayat level to provide remunerative prices along with subsidies through effective cooperative system. Farmers having sufficient irrigation facilities or living in low lying riverbed areas can choose fishery as an additional enterprise. Marginal farmers or land less farmers living nearby fruit orchards can integrate apiary and mushroom in to their existing farming systems.

Provision for loan through different funding agencies and simplified/ transparent farm loan procedure in banks helps farmers to take up different farm enterprises.

Scientists should provide cluster wise live demonstrations on Integrated Farming System to increase the self-confidence and interest of farmers in rural areas which could attract and retain youth in agriculture to greater extent.

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