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A Study on Effects of Integrated Farming System (IFS) On Agricultural Lands in the Sulur Taluk of Coimbatore.

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ABSTRACT
Integrated farming system (IFS) is an eco friendly approach in which Using waste from one business as an input for another, integrated farming systems (IFS) are an environmentally responsible method that maximizes the use of farm resources. IFS is a type of mixed farming system made up of two or more independent but logically connected components of livestock and crop companies. Enhancing soil health, controlling weeds and pests, increasing water usage efficiency, and maintaining water quality are all made possible by IFS. The use of dangerous chemical pesticides, weed killers, and fertilizers should be reduced in integrated farming systems in order to protect the environment from their negative impacts. And in this study we are going to see the results in the areas of sulur taluk of Coimbatore city.

Key words: Integrated farming system (IFS), Mixed farming, Sulur taluk.

I. INTRODUCTION

The International Organization of Biological Control (IOBC) describes integrated farming according to the UNI 11233-2009 European standard as a farming system where high quality organic food, feed, fibre and renewable energy are produced by using resources such as soil, water, air and nature as well as regulating factors to farm sustainably and with as few polluting inputs as possible.

Particular emphasis is placed on an integrated organic management approach looking at the whole Bio farm as a cross-linked unit, on the fundamental role and function of Agro-ecosystems, on nutrient cycles, which are balanced and adapted to the demand of the crops, and on health and welfare of all livestock on the farm. Preserving and enhancing soil fertility, maintaining and improving a diverse environment and the adhering to ethical and social criteria are indispensable basic elements. Crop protection takes into account all biological, technical, and chemical methods, which then are balanced carefully with the objective to protect the environment, to maintain profitability of the business and full fill social require.

STATEMENT OF THE PROBLEM:

Integrated farming encourages diversification by combining multiple agricultural activities on a single farm. This diversity not only minimizes risks associated with monoculture but also promotes resilience against pests, diseases, and market fluctuations. By utilizing resources such as land, water, and nutrients more efficiently, integrated farming maximizes productivity while minimizing waste. For example, crop residues can be used as feed for livestock, and animal manure can fertilize crops, creating a closed-loop system. Incorporating crop rotation, intercropping, and agroforestry practices enhances soil structure, fertility, and moisture retention.

OBJECTIVE OF THE STUDY:

- To find out the yield level and the crops cultivated using the IFS farming in the sulur taluk of Coimbatore.
- To analyse the cultivation and supplement size in the study areas of sulur taluk of Coimbatore.
- To find out the challenges and problems faced while IFS in the sulur taluk of coimbatore.
- To give suitable suggestions and suitable idea for improving the overall performance of the IFS.

SCOPE OF THE STUDY:

A combination of one or more enterprises with cropping when carefully chosen, planned and executed gives greater dividends than a single enterprise, especially for small and marginal farmers. The scope of an Integrated Farming System (IFS) involves a comprehensive examination of various interconnected agricultural activities within a single farming operation. Provide an overview of what Integrated Farming Systems entail, highlighting the integration of different agricultural components such as crops, livestock, aquaculture, agroforestry, and other complementary activities. Detail the different components involved in integrated farming, including crop production, livestock management, aquaculture, agroforestry, nutrient recycling, and renewable energy production. Explore the potential benefits offered by integrated farming systems, such as increased overall productivity, improved resource use efficiency, enhanced biodiversity, soil health improvement, and resilience to climate change and market fluctuations.

The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other farming system. For example duck act as a pest for fingerling. Economic and financial problems are the next important category of problems faced by the respondents which accounted for 85.83 per cent of the respondents The problems perceived by respondents were identified based on combination of various components. It is observed that almost all the respondents (100%) had perceived the problem of diseases and pests. It was observed that a pest attack on one farming system hampered the production process of the other

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II. RESEARCH METHODOLOGY:

Data Collection:

The data and other information's required for the study were collected from both primary and secondary sources. The primary data is collected through respondents directly and the secondary data is collected from various sources including libraries, journals, newspapers and websites. The mode of data collection is survey method.

Sample Method:

The sampling technique used for the study is convenience sampling. It is a type of non – probability which involves the sample being drawn from the population which is close to hand. Sample size taken in this study is 241 respondents.

Area of the Study:

A study is conducted in Coimbatore city.

Tools used for Analysis:

The following statistical tools are applied in accordance with the objective of study.

- Simple percentage Analysis.
- Weighted Average Method with Ranking.
- Chi – Square Test.

LIMITATIONS OF THE STUDY

Integrated farming systems (IFS) have numerous benefits, but like any approach, they also have limitations. Here are some common limitations associated with integrated farming systems:

Modern farming methods have overused the natural resource base. Increased use of fertilizers has led to the loss of soil fertility. The use of groundwater for tube well irrigation has led to water depletion. Modern farming methods require a great deal of capital.

III. REVIEW OF LITERATURE:

CS Shyam, Kapila Shekhawat, Sanjay Singh Rathore, Subhash Babu, Rajiv Kumar Singh, Pravin Kumar Upadhyay, Anchal Dass, Ayesha Fatima, Sandeep Kumar, GD Sanketh, Vinod Kumar Singh (2023)[1] Therefore, a study to address these challenges, through integrating diverse crops and allied enterprises under an integrated farming system (IFS) model was carried out and concluded with the maximum water productivity (6.72 kg/m3), energy productivity (1.50 kg/MJ), net return (9446 USD/ha), employment opportunities (792 man-days), sustainable livelihood index (70.2%), and nutrient cycling (138.12, 67.9, and 381.6 kg/ha of nitrogen, phosphorus, and potassium, respectively). These findings can be a scientific basis for the optimization and sustainable management of natural resources under different modules of IFS for the less-endowed small and marginal farmers.

Poonam Kashyap, Ashisa K Prusty, Azad S Panwar, Venkatesh Paramesh, Ravisankar Natesan, M Shamim, Nisha Verma, Phool Chand Jat, Mahendra Pal Singh (2022)[2] a study was conducted over four years, from 2016 to 2019, to define the farming condition in 1036 households in the Muzzafarnagar district of Western Uttar Pradesh and concluded with the conclusion of With the adoption of a multitier-based system, the net returns from the system improved from 0.6 lakh to 2.20 lakhs per ha.

Enhancing the fodder availability resulted in a 27.5% milk yield improvement. The study'outcomes demonstrated that a five-member family's annual protein (110–125 kg) and carbohydrate (550 to 575 kg) requirements can be easily met using the IFS technique. According to the study, IFS approaches combined with better technical interventions can ensure the long-term viability of farming systems and improve livelihoods.

Sanjeev Kumar, Amitav Dey, Ujjwal Kumar, Rakesh Kumar, Surajit Mondal, Ajay Kumar (2022)[3] which is technologically sound, economically viable, environmentally benign and socially acceptable for middle Indo-Gangetic Plains and concluded with the Crop integrated with fish+duck+goat had the maximum rice grain equivalent yield (RGEY), net returns and employment opportunity (467 man-days/year) from 0.8 ha land, followed by crop+fish+poultry integration. The sustainability index (0.77) and net energy gain (95770 MJ) were also found highest with crop+fish+duck+goat integration indicating the optimum efficiency of all the farming system integrations for the region.

DR Palsaniya, Sunil Kumar, MM Das, T Kiran Kumar, Sunil Kumar, Manoj Chaudhary, Khem Chand, SK Rai, Akram Ahmed, CS Sahay, Mukesh Choudhary (2021)[4], absence of by-product and resource recycling and concluded with the IFS approach ensured round the year supply of income and a farmer can get approximately 265 to

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597 US$ every month while he gets income only twice a year by adopting double cropping. Further, nearly 10.22 tonnes of farm yard manure and 2.5 tonnes of farm compost were recycled under IFS that improved soil health as compared to the double cropping. The study concluded that the IFS approach is capable of producing multiple products, improving productivity, profitability, employment opportunities, soil health and sustaining livelihood in vulnerable ecologies like SAT of central India and other parts of the world.

IV. DATA ANALYSES AND INTERPRETATION

SIMPLE PERCENTAGE ANALYSIS

Percentage refers to a special kind of ratio. Percentages are used in making comparison between two or more series data. Percentages are used to describe relationship, since the percentage reduces everything to a common base and thereby allows meaningful comparisons to be made.

Formula for simple percentage analyses :

$$= \frac{\text{No of respondence}}{\text{Total number of respondent}} \times 100$$

S. NO	VARIABLES	CATEGORIES	NO. OF RESPONDENTS	PERCENTAGE %
1	Gender	Male	136	57
		Female	105	43
Total			241	100
2	Age	Between 18-30 years	96	40
		Between 30-40 years	64	27
		Between 40-50 years	36	15
		Above 50 years	45	18
Total			241	100
3	**Educational Qualifications**	**Illeterate**	60	25
		School level	90	37.5
		Graduate	71	29
		Professional	20	8
Total			421	100
4	**Marital status**	**Single**	112	47
		Married	129	53

Total			241	100
5	**Income**	**Below 250000**	60	25
		Between rs 250001-400000	80	33
		Between rs 400001-600000	71	29
		Between rs 600001-1000000	16	7
		Above Rs 1000000	14	6
Total			241	100
6	**Family type**	**Nuclear Family**	150	62.5
		Joint Family	91	37.5
Total			241	100
7	**Area of location**	**Urban area**	92	38
		Semi – Urban area	68	28
		Rural area	81	34
Total			241	100
8	**Work experience**	**New to the Field**	76	32
		1-5 years	88	37
		6-9 years	75	31
		Above 10 years	22	9
Total			241	100
9	**Land size**	**Below 2.5 acres**	60	25
		Between 2.5-5 acres	81	33.5
		Between 5-10 acres	70	29
		Above 1 acres	30	12.5

Total			241	100
10	**Occupational type**	**Full time**	141	58.33
		Passive timings	100	41.67
Total			241	100
11	**Systematic crop structure**	**Single crop**	84	35
		Dual systematic crop	53	22.5
		Multilevel crop	102	42.5
Total			241	100
12	**Yield category**	**Daily**	81	33.33
		Monthly	90	37.5
		Half yearly	40	16.67
		Annually	30	12.5
Total			241	100
13	**Fertilizers**	**Organic**	135	55.83
		Artificial	106	44.16
Total			241	100
14	**Water irrigation**	**Canal water**	84	35
		Rain water	35	14.16
		Sprinkler	40	16.67
		Drip	82	24.16
Total			241	100
15	**Electricity**	**Free electricity**	107	44.16
		Partial aided by government	52	21.66

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		Fully paid by self	82	34.16
Total			241	100
16	**Insured schemes**	**NAIS**	30	12.5
		PMKMY	73	30
		UPIS	56	23.33
		PMFBY	83	34.16
Total			241	100
17	**Crops type harvested**	**Root**	57	23.33
		Fungus	44	18.33
		Leaves	84	35
		Fruits	56	23.33
Total			241	100

SOURCE: Primary Data

Interpretation:

From the above table (57%) of the respondents are male and mostly (40%) of the respondents age is 18 to 30 Years. Mostly(37.5%) of the respondents are school level. Majority (53%) of the respondents are single. Mostly (33%) of the respondents have an income of 250001-400000. Majority (62.5%) of the respondents are nuclear family type. Mostly (38%) of the respondents are in urban area. Mostly (37%) of the respondents have an experience of 1-5 Years. Mostly (33.5%) of the respondents have an area of 2.5 to 5 acres of land. Majority (58.33%) of the respondents occupy the IFS in Full time. Mostly (42.5%) of the respondents aggregate a multilevel crop. Mostly (37.5%) of the respondents have an monthly sales. Majority (55.83%) of the respondents uses organic fertilizer. Mostly (24.16%) of the respondents uses drip method water irrigation. Mostly (34.16%) of the respondents have consumed 101-150 MT Tons of water. Mostly (44.16%) of the respondents uses free electricity provided by the government. Mostly (34.16%) of the respondents insured by PMFBY. Mostly (23.33%) of the respondents uses roots and fungus crop types.

WEIGHTED AVERAGE METHOD WITH RANKING

Weighted average may be defined as the average whose component items are being divided by the total sum of their Weight instead of the sum of the items.

Formula for weighted arithmetic mean:

$$W = \frac{\sum_{i=1}^{n} w_i X_i}{\sum_{i=1}^{n} w_i}$$

XW - Represents the weighted arithmetic mean

V - Represents the variables.

W - Represents the weight attracted to the variable X

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TABLE SHOWING THE PROBLEMS ALONG WITH THE WEIGHTS AND RANKING

SOURCES	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree	Total	Weighted	Rank
water scarcity	200	184	108	240	38	770/241	3.20	4
	40	46	36	80	38			
manure problem	500	240	168	40	4	982/241	3.96	2
	100	60	56	20	5			
soil waste	140	152	138	240	8	748/241	2.82	6
	28	38	46	120	9			
soil erosion	120	144	240	140	30	744/241	2.80	7
	24	36	80	70	31			
lack of knowledge	550	256	96	40	14	956/241	3.98	1
	110	64	32	20	15			
financial needs	120	120	300	120	26	686/241	2.85	5
	24	30	100	60	27			
marketing needs	400	240	120	80	20	860/241	3.58	3
	80	60	40	40	21			
field assistance	80	104	240	200	18	642/241	2.67	8
	16	26	80	100	19			

SOURCE: Primary Data

Interpretation:
The above listed Table 4.2.1 shows the problems faced by the IFS Farmers and there is also the weights and ranking is calculated of the extend levels of their problem factors.
Rank 1 – Lack of knowledge
Rank 2 – Manure problem
Rank 3 – Marketing needs
Rank 4 – Water scarcity
Rank 5 – Financial needs
Rank 6 – Soil waste
Rank 7 – Soil erosion problem
Rank 8 – Field assistance

The ranks from 1 to 3 is means to be the mostly considerable factors of the problems which are faced by the IFS Farmers and the ranks from 4 to 8 means to be the secondary considerational factors for intention towards the problems faced by the IFS Farmers.

CHI SQUARE TEST:
The Chi-square test is a statistical test used to determine whether there is a significant association between categorical variables. It's commonly used

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to analyze data where you have counts of observations falling into categories.

The test works by comparing the observed frequencies (counts) of data to the frequencies that would be expected under a null hypothesis of no association between the variables.

Here's the formula for the Chi-square test statistic:

χ^2 = Σ [(Observed frequency - Expected frequency)² / Expected frequency]

In words, you calculate the Chi-square statistic by taking the sum over all categories of the squared difference between the observed frequency and the expected frequency for each category, divided by the expected frequency for that category.

TABLE SHOWING THE RELATIONAL ASSOCATION BETWEEN THE GENDER AND INCOME LEVEL BY THE IFS

FACTORS	SIGNIFICANT VALUE	DF VALUE	P VALUE	S/NS
Below 2.5 l	4.471	3	0.192	**NS**
Between 2.5-5	0.366	3	0.985	**NS**
Between 5-10 l	2.811	3	0.422	**NS**
Above 10 l	5.398	3	0.145	**NS**
AVERAGE	3.2615	3	0.436	**NS**

Null Hypothesis (H0): There is no significant association between gender and the income earned through IFS farming

Alternative Hypothesis (H1): There is a close significant association between Gender and income earned through IFS farming

INTERPRETATION

It is disclosed from the above analysis that the calculated P value (0.436) is less than the Significant value (03.2615). Hence null hypothesis is accepted.

V. FINDINGS

- In this study, 40%of the respondents age is 18 to 30 Years.
- In this study, 37.5%of the respondents are school level.
- In this study, 53% of the respondents are single.
- In this study, 57% of the respondents are male.
- In this study, 33% of the respondents have an income of 250001-400000.
- In this study, 62.5% of the respondents are nuclear family type.
- In this study, 38% of the respondents are in urban area.
- In this study, 37% of the respondents have an experience of 1-5 Years.
- In this study, 33.5% of the respondents have an area of 2.5 to 5 acres of land.
- In this study, 58.33% of the respondents occupy the IFS in Full time.
- In this study, 42.5% of the respondents aggregate a multilevel crop.
- In this study, 37.5% of the respondents have an monthly sales.
- In this study, 55.83% of the respondents uses organic fertilizers.
- In this study, 24.16% of the respondents uses drip method water irrigation.
- In this study, 34.16% of the respondents have consumed 101-150 MT Tons of water.
- In this study, 44.16% of the respondents uses free electricity provided by the government.
- In this study, 34.16% of the respondents insured by PMFBY.
- In this study, 23.33% of the respondents uses roots and fungus crop types.
- The ranks from 1 to 3 is means to be the mostly considerable factors of the problems which are faced by the IFS Farmers and the ranks from 4 to 8 means to be the secondary considerational factors for intention towards the problems faced by the IFS Farmers.
- There is no significant relationship between Gender and income earned through the IFS farming
- There is no significant relationship between Age and income earned through the IFS farming.

- There is no significant relationship between Educational Qualification and income earned through the IFS farming

VI. SUGGESTIONS

Integrated farming systems (IFS) involve combining different agricultural activities such as crop cultivation, livestock rearing, aquaculture, and agroforestry in a synergistic manner to maximize efficiency, productivity, and sustainability. When considering combinational structures of crops within an IFS, it's important to select crops that complement each other in terms of resource utilization, growth patterns, and market demand. Here are some suitable suggestions for implementing integrated farming systems with combinational structure crops.

An integrated farming system, designed for sustainability and efficiency, could incorporate various components such as crop cultivation, livestock rearing, aquaculture, and agroforestry. By diversifying agricultural activities, this system aims to optimize resource utilization, minimize waste, and enhance overall productivity. Crop residues and organic waste from livestock can be recycled as nutrients for crops through composting or bio-digestion, reducing the need for external inputs. Livestock can also provide manure for fertilizing crops and contribute to weed and pest control through rotational grazing. Intercropping and agroforestry practices can enhance biodiversity, soil health, and microclimate regulation. Furthermore, incorporating aquaculture ponds or integrated fish farming systems can supplement protein sources and provide additional income streams. Effective water management strategies, such as rainwater harvesting and efficient irrigation techniques, should be integrated to maximize water use efficiency. Overall, such an integrated approach fosters resilience against environmental fluctuations, promotes sustainable resource management, and supports the long-term viability of agricultural systems.

VII. CONCLUSION

The above Analyses and interpretations show the problems, yield structure, manure and supplements type used and crop combinational structures are the main intention focus of this paper where other factor are the supporters for the primary query of the primary needs of the paper and also intention to give suitable suggestions for the farmers based on the study paper and interpretations. And yes it is done by positive factors and introduce some new methods of agricultural methods for increasing the yield, reducing the work time and pressure and interpret a clear pathway of handling crops.