P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
Gujarat Journal of Extension Education Vol. 39 : Issue 2 : June - 2025 https://doi.org/10.56572/gjoee.2025.39.2.0020

RELATIONSHIP BETWEEN THE PROFILE OF THE BANANA GROWERS AND THEIR INTEGRATED CROP MANAGEMENT

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ABSTRACT

This study investigates the relationship between the profile of banana growers in the Vadodara district and their Integrated Crop Management (ICM) practices. Data were collected from 120 banana growers across selected talukas using a simple random sampling method. The study employed an 'Ex-post-facto' design to analyze the impact of various factors on ICM practices. The results indicate that the majority of respondents were middle-aged, had higher secondary education, and possessed over 20 years of experience in banana cultivation. They belonged to families with up to four members and held medium-sized landholdings. Extension participation was moderate, while agri-mass media exposure was also at a medium level. Respondents exhibited high scientific orientation, economic motivation, and medium to high levels of risk orientation and innovativeness. Out of fifteen independent variables analyzed, education, experience in banana cultivation, annual income, size of landholding, livestock possession, extension participation, agri mass media exposure, scientific orientation, economic motivation, risk orientation, and innovativeness had a positive and significant relationship on the management of ICM practices. Conversely, age, family size, training received, and social participation did not show a significant correlation with ICM practices. These findings provide valuable insights for designing targeted interventions to enhance the management of ICM practices among banana growers in Vadodara district.

Keywords: *banana growers, integrated crop management, practices, profile, significant correlation, relationship*

INTRODUCTION

ICM is a holistic and site-specific approach to sustainable agriculture that considers the production factors across the whole farm, including on-farm resources, and socio-economic and environmental factors; to deliver the most suitable and safe approach for long-term benefits (Choudhary *et al.*, 2020). ICM is an innovative and holistic approach to agricultural production that aims to optimize crop yields. The ICM involves different crop management practices and technologies to increase crop yields, reduce environmental damage, and sustain crop production. It integrates various management practices, technologies, and strategies to address the complex challenges faced by farmers, such as pest and disease management, soil degradation, water scarcity, and climate change. The ICM is a whole-systems approach based on knowledge and stresses the importance of understanding local ecosystems and changing management practices to be better suited to these ecosystems (Malo, 2021).

It integrates suitable agronomic management practices for raising a good crop including tillage and crop establishment methods, integrated nutrient management (INM), integrated weed management (IWM), integrated water management (IWrM), integrated disease management (IDM) and integrated pest management (IPM) and integrated energy management (IEM), *etc.* (Kumar *et al.*, 2020).

Bananas and plantains are grown in about 120 countries. India leads the world in banana production with an annual output of about 34.50 million tonnes (Anon., 2022a). Production is highest in Andhra Pradesh (5,838.88 thousand tones) followed by Maharashtra (4,628.04 thousand tonnes) (Anon., 2022a). Gujarat ranks 3rd and it constitutes 12.04 per cent of the total banana production in India. Vadodara district is an important place for banana cultivation in Gujarat state. In 2021-22 bananas were cultivated in 6560 hectares, of which 4,46,736 MT was produced in Vadodara district (Anon., 2022b). This study aims to uncover the specific practices employed by banana growers, thereby contributing to the advancement of sustainable agricultural methods in the region.

Understanding the relationship between the profile of the banana growers and their ICM practices can provide valuable insights into the factors influencing

ICM decisions. This research investigates how different aspects of farmer's profiles including their age, education, landholding, experience in banana cultivation, size of family, social participation, extension participation, and economic condition affect their ICM practices.

The research will focus on understanding the current practices employed by banana growers, including pest and disease management, soil fertility enhancement, water management, weed control, and post-harvest practices. By delving into these areas, researchers can explore specific techniques and strategies that optimize banana production, improve sustainability, and address the unique challenges faced by banana growers. Additionally, the research will explore the factors influencing ICM practices in far above-mentioned strategies, such as farm size, available resources, access to information, and socio-economic considerations.

OBJECTIVES

(1) To study the profile of the banana growers of Vadodara district

(2) To ascertain the relationship between the profile of the banana growers and their integrated crop management

METHODOLOGY

The study was conducted in the Vadodara district of middle Gujarat State. Vadodara district consists of twelve talukas among which four talukas namely Dabhoi, Karjan, Shinor, and Vadodara have been purposively selected based on the highest area in banana cultivation. Taluka-wise list and numbers of the banana growers of Vadodara district were obtained from the Deputy Director of Horticulture and District Agriculture Officer, Vadodara. Afterward, two villages were randomly selected from each taluka. Thus, a total of 8 villages were selected for this study. Employing a simple random sampling technique, 120 banana growers were selected from four talukas and eight designated villages to participate in the study. An ex-*post-facto* research design (Kerlinger, 1976) was employed for the study. Data were collected through personal interviews using a specially designed and pre-tested interview schedule, initially prepared in English. The schedule was refined based on pre-testing with 20 non-sampled respondents. The variables selected which deemed most pertinent to the current investigation were age, education, size of family, experience in banana cultivation, annual income, land holding, livestock possession, social variables, social participation, training received, communicational characteristics, extension participation, agri mass media exposure, psychological characteristics, scientific orientation, economic motivation, risk orientation, innovativeness after a thorough review of literature, consultation with experts, and consideration of previous research conducted on the topic.

RESULTS AND DISCUSSION

Personal characteristics

The personal characteristics of the respondents play an important role in the ICM practices. Some of the following personal variables were selected and analyzed and are presented in Table 1.

Table 1: Personal characteristics of the banana growers in ICM practices (n = 120)

Variables	Categories	Frequency	Percent
Age	Young group (up to 35 years)	11	09.20
	Middle group (36 to 50 years)	88	73.30
	Old group (above 50 years)	21	17.50
Education	Illiterate	02	01.70
	Primary education (1st to 8th std)	03	02.50
	Secondary education (9th and 10th std)	25	20.80
	Higher secondary education (11th and 12th std)	48	40.00
	Graduation and above	42	35.00
Size of family	Up to 4 members	19	15.80
	5 to 8 members	89	74.20
	More than 8 members	12	10.00
Experience in banana cultivation	Up to 5 years	05	04.16
	6 to 10 years	08	06.67
	11 to 15 years	16	13.33
	16 to 20 years	41	34.17
	Above 20 years	50	41.67

From Table 1, it can be concluded that Nearly three-fourths (73.30 percent) of the banana growers had belonged to the middle age group, followed by 17.50 per cent of the banana growers belonged to old age group and 9.20 per cent of banana growers belonged to young age groups. Exactly two-fifths (40.00%) of the banana growers were educated from higher secondary, followed by graduation and above education (35.00%) and secondary level of education (20.80%) whereas, 2.50 per cent banana growers had primary education, respectively. Only 1.70 per cent of them were illiterate. Slightly less than three-fourths (74.20%) of the banana growers had up to 4 members in the family, followed by 5 to 8 members (15.80%) and more than 8 members (10.00%) in the family, respectively. More than two-fifths (41.67%) of the banana growers had above 20 years of experience in banana cultivation, followed by 34.17 per cent, 13.33 per cent, 06.67 per cent and 04.16 per cent of them had 16 to 20 years, 11 to 15 years, 6 to 10 years, and up to 5 years level of experience in banana cultivation, respectively.

Economical characteristics Economic characteristics are attributes related to an individual's economic environment and financial status. In the study Table 2, specifies the economic characteristics of the farmers. From Table 2, it can be found that less than one-third (29.17%) of the banana growers had annual income ranging from above ₹ 4,00,00/ followed by 22.50 per cent having annual income ranging from ₹ 3,00,001/- to ₹ 4,00,000/-, 20.83 per cent having annual income ranging from ₹ 2,00,001/- to ₹ 3,00,000/-, 17.50 per cent having annual income above to ₹ 1,00,001/- to ₹ 2,00,000/. The rest of them (10.00%) have annual incomes up to ₹ 1,00,000/-. More than one-third (38.33%) of the banana growers had a medium size of landholding, followed by large size (24.17%) and semi-medium size (20.83%) whereas, only 12.50 per cent and 4.17 per cent of the banana growers had possessed small size and marginal size landholding, respectively. Slightly more than half (51.70%) of the banana growers had ranged from up to 3 animals, followed by 26.70 per cent of the banana growers had 4 to 6 animals, and 21.60 per cent had above 6 animals.

Table 2: Economical characteristics of the banana growers in ICM practices (n = 120)

Variables	Categories	Frequency	Percent
Annual income	Up to ₹ 1,00,000/-	12	10.00
	₹ 1,00,001/- to ₹ 2,00,000/-	21	17.50
	₹ 2,00,001/- to ₹ 3,00,000/-	25	20.83
	₹ 3,00,001/- to ₹ 4,00,000/-	27	22.50
	Above ₹ 4,00,000/-	35	29.17
Size of landholding	Marginal (Up to 1.00 ha)	05	04.17
	Small (1.01 to 2.00 ha)	15	12.50
	Semi medium (2.01 to 4.00 ha)	25	20.83
	Medium (4.01 to 10.00 ha)	46	38.33
	Large (Above 10.00 ha)	29	24.17
Livestock possession	Up to 3 animals	62	51.70
	4 to 6 animals	32	26.70
	Above 6 animals	26	21.60

Social characteristics

Social characteristics are attributes that describe an individual's social environment and interactions. These include aspects like family structure, community involvement, social networks, educational background, cultural practices, and social status. From Table 3, it can be showed that nearly half (48.30%) of the banana growers had no membership in any organization, followed by 38.30 per cent, 9.20 per cent, 2.50 per cent and 1.70 per cent of them had membership in one organization, membership in two organizations, membership in more than two organizations and membership along with position holder in any organization, respectively. More than half (55.00%) of the banana growers had not received any training, followed by 21.67 per cent, 15.00 per cent and 5.83 per cent of them had received one training, two training, and three training, whereas 2.50 per cent of them had received more than three training.

Table 3: Social characteristics of the banana growers in ICM practices (n = 120)

Variables	Categories	Frequency	Percent
Social participation	No membership	58	48.30
	Membership in one organization	46	38.30
	Membership in two organizations	11	09.20
	Membership in more than two Organizations	03	02.50
	Holding position in organization	02	01.70
Training received	No training	66	55.00
	One training	26	21.67
	Two trainings	18	15.00
	Three trainings	07	05.83
	More than three trainings	03	02.50

Communicational characteristics

Communicational characteristics are attributes that define how an individual interacts and exchanges information with others. These include verbal and non-verbal communication skills, language proficiency, listening abilities, interpersonal skills, and the effectiveness of conveying and interpreting messages. Table 4 observed that equally (32.50%) of the banana growers had a medium and high level of extension participation, followed by 14.20 per cent had a low level of extension participation, 11.70 per cent had a very low level of extension participation and the remaining 9.20 per cent had a very high level of extension participation. Overwhelming more than one-third (35.80%) of the banana growers had a medium level of mass media exposure, followed by 24.20 per cent, 15.90 per cent and 18.30 per cent of them had high, very high, and low levels of mass media exposure, and the remaining 5.80 per cent had a very low level of mass media exposure.

This outcome aligns with the findings of Chaudhary *et al.* (2022) and Patel et al. (2018).

Table 4: Social characteristics of the banana growers in ICM practices (n = 120)

Variables	Categories	Frequency	Percent
Extension participation	Very low (Up to 02.40 score)	14	11.70
	Low (02.41 to 04.80 score)	17	14.20
	Medium (04.81 to 07.20 score)	39	32.50
	High (07.21 to 09.60 score)	39	32.50
	Very high (Above 09.60 score)	11	09.20
Agri mass media exposure	Very low (Up to 01.60 score)	07	05.80
	Low (01.61 to 03.20 score)	22	18.30
	Medium (03.21 to 04.80 score)	43	35.80
	High (04.81 to 06.40 score)	29	24.20
	Very high (Above 06.40 score)	19	15.90

Psychological characteristics

Psychological characteristics are attributes that define an individual's mental and emotional state. These include personality traits, cognitive abilities, emotional intelligence, mental health status, attitudes, motivations, and coping mechanisms. In ICM practices psychological characteristics like scientific orientation, economic motivation, risk orientation and innovativeness play major role. In the present study, Table 5, showed that the psychological characteristics

of the banana growers. From the Table 5, it is implicated that, exactly half (50.00%) of the banana growers had a very high level of scientific orientation, followed by 42.50 percent with a high level, 5.00 per cent with a medium level, and 2.50 per cent with a low level of scientific orientation, respectively. Slightly more than half (56.60%) of the banana growers had very high level of economic motivation, followed by 36.70 per cent with high, 5.00 per cent with medium and 1.70 per cent low level of economic motivation. None of the banana growers had very low level of the economic motivation. Overwhelming more than one-third (40.84%) of the banana growers had medium level of risk orientation, followed by 31.70 per cent, 15.00 per cent, 9.16 per cent and 3.30 per cent of them had high, very high, low and very low level of risk orientation, respectively. Exactly three-fifths (60.00%) of banana growers had medium level of innovativeness, followed by 16.67 per cent, 11.67 per cent, 9.16 per cent and 2.50 per cent of them had a high, very high, low, and very low level of innovativeness, respectively.

Table 5: Psychological characteristics of the banana growers in ICM practices (n = 120)

Variables	Categories	Frequency	Percent
Scientific orientation	Very low (Up to 25.20 score)	00	00.00
	Low (25.21 to 36.40 score)	03	02.50
	Medium (36.41 to 47.60 score)	06	05.00
	High (47.61 to 58.80 score)	51	42.50
	Very High (Above 58.80 Score)	60	50.00
Economic motivation	Very Low (Up to 10.80 score)	00	00.00
	Low (10.81 to 15.60 score)	02	01.70
	Medium (15.61 to 20.40 score)	06	05.00
	High (20.41 to 25.20 score)	44	36.70
	Very High (Above 25.20 score)	68	56.60
Risk orientation	Very low (10.00 to 18.00 score)	04	03.30
	Low (19.00 to 26.00 score)	11	09.16
	Medium (27.00 to 34.00 score)	49	40.84
	High (35.00 to 42.00 score)	38	31.70
	Very high (43.00 to 50.00 score)	18	15.00
Innovativeness	Very low (06.00 to 10.80 score)	03	02.50
	Low (10.81 to 15.60 score)	11	09.16
	Medium (15.61 to 20.40 score)	72	60.00
	High (20.41 to 25.20 score)	20	16.67
	Very high (25.21 to 30.00 score)	14	11.67

Relationship between the profile of the banana growers and their integrated crop management

The banana grower's level of ICM practices is influenced by various personal, socio-economical, communicational, and psychological attributes. Factors such as age, education level, income, farm size, access to information, and psychological traits like attitudes toward innovation and problem-solving skills significantly affect implementing ICM practices. This investigation aimed to determine the relationship between these selected characteristics and the level of ICM adoption by computing the correlation coefficient. The results, which provide a detailed statistical breakdown and visual representation, are presented in Table 6 and Figure 1, respectively, offering valuable insights into how various factors contribute to the ICM practices of banana growers. A statistical method of Karl Pearson's coefficient correlation (r) was used to calculate the relationship between the characteristics of the banana growers and their integrated crop management.

The outcome of this study is in conformity with the findings of Supe, S.V., (1969), Patel et al. (2009).

Table 7: Relationship between the profile of the banana growers and their ICM (n = 120)

Sr. No.	Independent variables	'r' value
X_1	**Age**	0.091
X_2	**Education**	0.225*
X_3	**Size of family**	-0.054
X_4	**Experience in banana cultivation**	0.199*
X_5	**Annual income**	0.334**
X_6	**Size of landholding**	0.305**
X_7	**Livestock possession**	0.221*
X_8	**Social participation**	0.096
X_9	**Training received**	0.110
X_{10}	**Extension participation**	0.204*
X_{11}	**Agri mass media exposure**	0.225*
X_{12}	**Scientific orientation**	0.560**
X_{13}	**Economic motivation**	0.335**
X_{14}	**Risk orientation**	0.217*
X_{15}	**Innovativeness**	0.197*

* Significant at 0.05 per cent level of probability

**Significant at 0.01 per cent level of probability

It is evident from the data presented in Table 7 that, among the fifteen selected variables in the study, four variables such as annual income (0.334**), size of landholding (0.305**), scientific orientation (0.560**), and economic motivation (0.335**) had positive and highly significant influence with integrated crop management, whereas seven variables such as education (0.225*), experience in banana cultivation (0.199*), livestock possession (0.221*), extension participation (0.204*), agri mass media exposure (0.225*), risk orientation (0.217*) and innovativeness (0.197*) had a positive and significant influence with integrated crop management practices, while in contrast, age, family size, social participation, and training received did not show any correlation with their ICM practices.

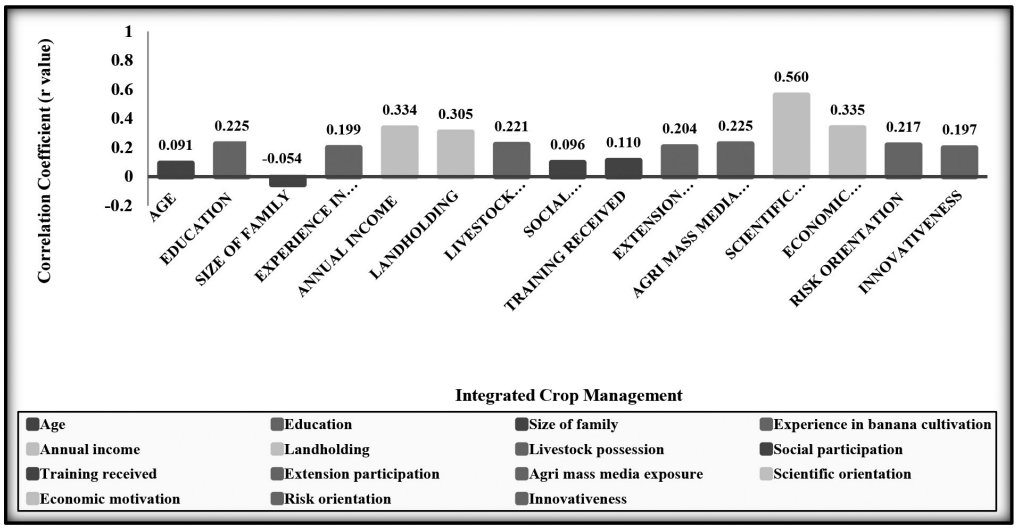

Fig. 1: Relationship between the profile of the banana growers and their integrated crop management

CONCLUSION

The present study concluded that the majority of the banana growers belonged to middle age group having a higher secondary level of education to graduation and above, had up to 4 members in the family, had annual income ranging from above ₹ 4,00,00/- and had above 20 years of experience in banana cultivation, had medium size of landholding, were having up to 3 animals, had no membership and membership in one organization with medium and high level of extension participation, had not received any training and medium level of agri mass media exposure. Further, a high level of scientific orientation, a very high level of economic motivation, a medium to high level of risk orientation, and had medium level of innovativeness too. Out of fifteen independent variables, eleven variables *viz.*, education, experience in banana cultivation, size of landholding, livestock possession, annual income, extension participation, mass media exposure, scientific orientation, economic motivation, risk orientation, and innovativeness had positive and significant correlations with their integrated crop management. The other four variables age, size of family, training received, and social participation had a non-significant relationship with their integrated crop management.

This finding corresponds with the findings reported by Gulkari and Chauhan (2018), Patel *et al.* (2018), Patel *et al.* (2020), Chaudhary *et al.* (2022), Patel *et al.* (2022), Warshini *et al.* (2022) and Mashaliya (2023).

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

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Received : April 2025 : Accepted : June 2025