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## RESEARCH ARTICLE

**Adoption of Banana Production Technology Among Banana Growers in Vaishali District of Bihar****Amrit Warshini<sup>1</sup>, A. A. Raut<sup>2</sup>, D.K. Jaiswal<sup>3</sup>**

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com**ABSTRACT**

*India's banana ranks first in production and third in area and Bihar ranks 7th in the country. Dwarf canvendish, Alpan, Chinia, Chinichampa, Malbhog, Muthia and Kothia are Bihar cultivars. The Vaishali district area around the ganga basin is known for its banana production. The study comprised 135 respondents from seven villages in Bidupur and Hajipur blocks of Vaishali District of Bihar. Correlation between knowledge and adoption of banana production technologies and profile of banana growers were obtained. The findings revealed that majority (66%) of the farmers had medium level of overall knowledge regarding recommended banana production technologies. In context of practice-wise knowledge it was found that most of the farmers had low knowledge level and majority (70%) of respondents had medium adoption of recommended technologies. High level of adoption was reported for practices like propagation method (82.67%), cutting-pruning and stacking (64.67%), irrigation management (59.33%) and selection of varieties (57.33%). Extension personnel and agriculture scientist might have enhanced production of banana through regular visit, training and guidance to farmers.*

**Key words :** Banana Growers; Adoption level; Banana production technology.

Agriculture is a primary source of income for the majority of India's population, which should never be out looked. Agriculture has been practiced in our country for thousands of years, and new technology and equipment have superseded ancient farming practices. Agriculture is the only sector that benefits both itself and the rest of the country.

The banana (*Musa sp.*) is India's second most important fruit crop after mango. It is the most popular fruit among all because of its year-round availability and various benefits. It is one of the most remunerative crops preferred by farmers for cultivation both in the uplands and lowlands (*Issac and Podikunj, 2012*). The banana is one of the world's oldest fruits and known as the "Apple of paradise" and is botanically known as *Musa paradisiaca*. It has a high export potential. Hi-tech crop cultivation is a financially feasible business that leads to increased productivity, improved product quality and early harvest (*Vitonde and Patil, 2005*).

Among the fruit crops, India's banana ranks first in production and third in area. It covers 13 per cent of

the entire land area and produces 33 percent of the total fruit production. Maharashtra has the largest production (392401 thousand tonnes). Karnataka, Gujrat, Bihar, AP and Assam are the main banana producing state. India leads the globe in banana production and area with total yearly output of 29.16 million metric tonnes from 358.0 thousand hectare in 2017.

Bihar ranks 7th in the country with the production of 1,968.21 tonnes ([agriexchange.apeda.gov.in](http://agriexchange.apeda.gov.in)). Dwarf canvendish, alpan, chinia, chinichampa, malbhog, muthia and kothia are Bihar cultivars.

The production of banana requires sufficient knowledge and positive attitude with improved management practices to make it commercially viable through adoption of improved management practices. The modern science and technology suggest adopting the improved agriculture and horticultural practices (*Sarker, 2016*).

The Vaishali district area around the ganga basin is known for its good production of horticultural crops. The climatic conditions in the district are ideal for

banana growing in the state with plenty of room to expand the area under this crop. Banana production is a specific sort of farming in this tract that provides more remunerative income to growers than conventional grain and pulse crops.

The main objective of this study was to determine the Knowledge and adoption of banana production technology by the growers of Vaishali district of Bihar. The specific objectives were (i) to identify the personal and socioeconomic characteristics of banana growers, (ii) to assess the banana grower's knowledge of banana production technology, (iii) to determine the extent of Adoption of banana production technology and (iv) To determine the relationship between the dependent and independent variables. The personal, socio-economic, communicational and psychological characteristics of banana growers as well as their knowledge and adoption of banana production technology practises, were studied in seven villages of Vaishali district. The relationship between the characteristics of growers of banana and their level of knowledge and adoption level was also investigated.

## METHODOLOGY

The study was conducted in Vaishali District of Bihar. Out of 16 blocks two blocks Bidupur and Hajipur were selected for study of banana production technology because it has the highest area in production of banana fruit crop.

From the selected two blocks, four villages were selected from Bidupur and three villages was selected from Hajipur block based on the maximum number of farmers and area. From each selected village 02 percent of the farmers were selected on the basis of proportionate random sampling method. A household survey was conducted and data was collected using a semi-structured schedule through face-to-face interviews with 135 banana farmers, selected for the study purpose. The inquiry yielded results, which led to a conclusion.

## RESULTS AND DISCUSSION

Extent of adoption of banana growers: According to Table1 the majority of banana growers (61.00 %) had medium level of adoption of recommended banana production technology, while 24.00 percent and 15.00 percent of banana growers had low level and high level of adoption, respectively.

As per data in Table 1, maximum number of

**Table 1. Distribution of respondent according to their extent of adoption of recommended banana production technology (N=135)**

Adoption level	No.	%
Low adoption level	32	24.00
Medium adoption level	83	61.00
High adoption level	20	15.00
Total	135	100.00

Mean : 76.62; S.D : 15.09

respondents had medium level of adoption. *Prodhan (2017)* and *Thorat et al. (2014)* findings are similar with these observations.

Table 2 presents the extent of adoption of banana growers on the recommended package of practices of banana production technology. Majority of farmers had complete adoption for recommended package of practices of banana production technology for soil (98.52%), climatic condition (95.55%), preparatory tillage planting time (73.33%) and Selection of healthy sucker (71.12%). More than half of the respondents completely adopted seed treatment (53.33%), adoption of recommended varieties of banana (54.83%), use of recommended doses of chemical fertilizers (65.18%). However complete adoption was low in case of irrigation schedule, planting method, Tissue culture seedlings interculture operation, anti-transparent, plant growth regulators, intercropping, plant protection, pest control, harvesting, ripening and processing.

**Table 3. Correlation analysis of independent variables with extent adoption of recommended banana production technology**

Independent variables	"r" value
Age	-0.712**
Education	0.515**
Family type	0.201*
Land holding	0.065NS
Area under banana cultivation	0.285**
Annual income of banana	0.256**
Banana cultivation experience	0.335**
Risk orientation	0.566**
Extension contact	0.345**
Source of information	0.527**

\*Significant at 0.05 and \*\*Significant at 0.01 level of probability; NS : Non - Significant

The information in Table 3 showed the correlation between adoption of banana production technologies and profile of banana growers. The education, family type area under banana cultivation,

**Table 2. Extent of adoption of recommended package of practices of banana production technology**

Banana production technology	CA	PA	NA
Soil - Medium, deep and well-drained soil with pH- 6-8.5	133 (98.52)	2 (1.48)	0 (0.00)
Climate - Hot and Humid	129 (95.55)	6 (4.45)	0 (0.00)
Preparatory Tillage - 2 Deep ploughing, clod crushing, harrowing etc	128 (94.82)	7 (5.18)	0 (0.00)
Planting time: June – July; Oct- Nov.; Feb- March	99 (73.33)	31 (22.97)	5 (3.70)
Planting material			
Selection of healthy sucker (age 5 to 6m)	96 (71.12)	34 (25.18)	5 (3.70)
Tissue culture seedlings (height - 30-45 cm and 6 to 7 no. Of leaves)	7 (5.19)	89 (65.93)	39 (28.88)
Seed Treatment (sucker Treatment (with 100gm of carbendazim and 150gm of acetaphate in 100l of water for 30-40 min)	72 (53.33)	21(15.55)	42 (31.12)
Planting distance			
Square method (1.5m x 1.5m) and (1.75x1.75) for G-9	62 (45.94)	39 (28.88)	34 (25.18)
Paired row method (0.9 x 1.2 x 1.2m)	5 (3.70)	35 (25.93)	95 (70.37)
Adoption of recommended varieties of banana?	74 (54.83)	22 (16.29)	39 (28.88)
Fertilizer management			
Organic (FYM-10Kg/plant, vermicompost-5Kg/plant	54 (40.00)	62 (45.93)	19 (14.07)
Bio-fertilizers (Azospirillum-25g/plant)	16 (11.85)	56 (41.49)	63 (46.66)
Chemical - fertilizers (200:40:200) gm of NPK dose for each plant by spiting.	88 (65.18)	41 (30.37)	6 (4.45)
Micronutrients (Mg - 50g/plant, Zn-50g,B-50g)	19 (14.08)	92 (68.15)	24 (17.77)
Irrigation requirements - What is the interval between two irrigations (days)? How many days interval do you keep between two irrigations? As when required-Kharif - 15 days; Winter - 9 to 10 days; Summer - 4 days	43 (31.86)	54 (40.00)	38 (28.14)
Interculture operation			
Mulching with dried grass/ polythene/banana leaves	63 (46.66)	9 (6.68)	63 (46.66)
Weeding-Hand/chemical/ hoeing	56 (41.4)	71 (52.59)	8 (5.92)
Earthing up	3. (2.23)	59 (43.70)	73 (54.07)
Propping-Bamboo/eucalyptus	1 (0.75)	21 (15.55)	113 (83.7)
Trashing	3 (2.22)	78 (57.78)	54 (40.00)
Wrapping up-polythene/gunny/cloth weather any effect quality on fruits?	2 (1.48)	60 (44.44)	73 (54.08)
De-suckering	1 (0.75)	55 (40.74)	79 (58.51)
Anti-transparent- (Kaolin, selinate, cycosel)	4 (2.96)	105 (77.77)	26 (19.25)
Do you use of plant growth regulators? (50g of potassium dihydrogen + 100g urea + sticker 10ml in 10l of water and spray on banana bunch after removing banana flower)	34 (25.19)	32 (23.70)	69 (51.11)
Do you know about intercropping?	27 (20.0)	68 (50.37)	40 (29.63)
Plant protection (knowledge of important disease and control)			
Disease (knowledge and adoption)_Panama or wilt (50% cupper oxychloride)	3 (2.22)	75 (55.55)	57 (42.23)
Cigar end rot (10gm carbendazim or 10gm of dithane M- 45 or 25gm of COC + 100ml sticker in 100ml of water spray on affected plant).	6 (4.44)	81 (60.00)	48 (35.56)
Bunchy Top (Remove and destroy disease affected plant).	26 (19.2)	70 (51.85)	39 (28.88)
Pest control (Knowledge of important pest)			
Aphid (1.70l of Dimethoate 30 EC)	19 (14.0)	48 (35.5)	68 (50.38)
Banana weevil (spray 315ml of phosphamidon)	6 (4.44)	57 (42.23)	72 (53.33)
Banana stem borer (spray 2.5kg of carbaryl WP in 1250l of water per hectare)	3 (2.22)	64 (47.40)	68 (50.38)
Harvesting			
Flowering start 6 month after planting, fruit ready for harvesting after 12 months of planting.	22 (16.29)	55 (40.74)	58 (42.97)
For local market after 90% of ripening, for distance market after 65% of ripening.	41 (30.38)	59 (43.70)	35 (25.92)
Harvesting methods (use of sharp sickle for harvesting, remove the bunch by keeping the distance of 30cm from banana fruit).	36 (26.66)	68 (50.38)	31 (22.96)
Ripening of the banana after harvesting use ripening chamber for ripening			
Temp-14.5°C	49 (36.29)	47 (34.83)	39 (28.88)
Humidity- 90-95°C	15 (11.11)	24 (17.78)	96 (71.11)
Processed products			
Banana chips	1 (0.74)	58 (42.97)	76 (56.29)
Banana milk shake	0 (0.00)	11 (8.15)	124 (91.85)
Banana jam	0 (0.00)	8 (5.93)	127 (94.07)
Banana powder	0 (0.00)	5 (3.71)	130 (96.29)
Banana juice	1 (0.74)	6 (4.44)	128 (94.82)

(Figures in parenthesis indicates the percentage; CA=Complete adoption; PA=Partial adoption; NA=No adoption)

annual income of banana, banana cultivation experience, risk orientation, extension contact and source of information were found to be positively and significantly correlated with the extent of adoption level, whereas age was found to be negatively but significantly correlated with the extent of adoption level while land holding could not able to establish any kind of relationship between banana production technology with adoption level.

The constraints were reported based on a poll of farmer's opinion. According to Table 3, majority of banana growers (91.11%) cited crop destruction was done by stray animals such as Nilgai as a major constraint, followed by uncertainty in rain (86.66%), lack of information about various disease (82.96%) whereas from 63.70 to 75.55 percentage of banana growers reported constraints such as lack of infrastructure facilities, lack of information about new

technologies and no financial support was provided by government. A significant number of growers also reported constraints such as lack of awareness about processing and value addition, price fluctuation in market, more transportation charges, lack of availability of good varieties and tissue culture plants and information provided to them was insufficient. Similar findings were reported by *Shivaram (2014)* and *Kumari S (2019)*.

Table 4 shows that majority (88.14%) of banana growers suggested for proper equipment's should be provided by the government to stop stray animals, followed by 85.92 percent of banana growers asked for timely and accurate information, about 74.81 percent of banana growers suggested for systematic training programmes. 67.40 percent of growers have suggested for demonstrations of various new technologies, 62.22 percent and 60.00 percent of respondent stated that

**Table 4. Constraints faced by banana growers in adoption of recommended banana production technology**

Constraints	No.	%	Rank
Crop destruction was done by stray animals such as Nilgai.	123	91.11	I
In the summer, land become dry due to decrease in water table, strong wind velocities and uncertainty in rain	117	86.66	II
Lack of information about various disease symptoms, insect damages and recommended dosage of insecticide, pesticides and fertilizer etc.	112	82.96	III
There is no financial support was provided by government in terms of loan or any schemes on fruit crops.	102	75.55	IV
Lack of information about new technologies in banana cultivation.	97	71.85	V
The lack of infrastructure facilities like cold storage and also lack of market facilities for banana growers.	86	63.70	VI
A lack of awareness and knowledge about importance of processing and value addition.	73	54.07	VII
There is a price fluctuation in market.	67	49.62	VIII
Transportation fee levied was more.	61	45.10	IX
lack of availability of good varieties and tissue culture plants	59	43.70	X
Information and guidance provided was insufficient.	54	40.00	XI

**Table 5. Suggestions made by the Banana growers for overcoming the constraints**

Suggestions	No.	%	Rank
Proper equipment's and support should be provided by government to stop staray animal. Equipment's such as electronic repellents.	119	88.14	I
There is a need for timely and accurate information on banana cultivation technique.	116	85.92	II
A systematic training programmes were needed on various aspects of banana cultivation practices, recommended doses of fertilizers, insecticides and fungicides.	101	74.81	III
There is a need for organization for Demonstrations of various new technologies at local level.	91	67.40	IV
There is a need for subsidies on fertilizers, insecticides and pesticides of fruit crops.	84	62.22	V
There is a need of various processing unit for value addition in rural areas.	81	60.00	VI
The government should made available of seeds, fertilizer and insecticides at low price.	77	57.03	VII
There is a need for timely and accurate information about market prices.	70	51.85	VIII
Charges levied on transport must be reasonable and appropriate.	61	45.18	IX

they need subsidies on fertilizers and processing unit for value addition in rural areas. Majority (57.03%) and (51.83%) of respondents suggested that the government should made seed availability at low price and timely information should be provided while 45.18 percent of asked for reasonable and appropriate charges on transport.

## CONCLUSION

The following conclusion can be drawn in the light of stated findings. The majority of banana growers had medium level of extent of adoption of banana production technologies. Positive correlation value of education, family type, area under banana cultivation, annual income of banana, banana cultivation experience, risk orientation, extension contact and source of information were positively and significantly related with the level of knowledge and adoption of banana growers while age was found to be negatively but significantly correlated with the level of knowledge and extent of adoption. The identified constraints and suggestion need to be addressed by policy planners and extension functionaries to formulate suitable methodologies to improve adoption of banana production technology among banana growers.

## CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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