Behavioral contribution of farmers over physiological attributes in adoption process of Onion (Allium cepa) varieties

¹ Ashok Kumar Sharma, ² Sucheta Singh

¹Professor, ²Subject Matter Specialist/ Assistant Professor
¹G.B. Pant University of Agriculture & Technology, Pantnagar
U.S. Nagar, Uttarakhand 263145, India.

Abstract : Small and marginal holders of farming community plays a vital role in the agricultural productivity, enhancing climate resilience and food security. Much research on adoption of agriculture technology has focused on its agronomic benefits, but little attention has been paid to the contribution of the behavior of the farmers over its adoption process. To bridge the gap, a study is proposed to investigate the behavior of small farm holders towards the adoption of the Onion (Agri found light red) cultivar in district Dehradun (Uttarakhand). Farm Science Center has identified ecologically suited and having better self-life onion cultivar (Agri found light red) for the region. Seedlings of the onion variety Agri found light red are being distributed among the farmers from more than twelve years and the seedlings of onion are popular in the farming community. The data is gathered through a pretested questionnaire administered to 120 farmers selected through random sampling method along with key informants' interviews and personal observations. Out of ten characteristics studied age, education, area under onion crop, irrigation facilities, social participation, sources of information and scientific orientation, were positively and significantly correlated with knowledge and adoption level. Likewise, land holding was positively and significantly correlated only with knowledge and non-significantly correlated with adoption. The annual income of the respondents was non-significantly correlated with both knowledge and adoption.

Index Terms - **Adoption, Behavior, onion, Production Technology.**

I. INTRODUCTION

India is the second largest producer of onion in the   world [7]. Maharashtra is leading onion producing state in India and contributing 32 percent of total onion production of the country. It is used both in raw and mature bulb stage as well as vegetable and spice. The pungency in onion is due to the presence of volatile oil known as ally propyl disulphide [1][2]. Dehydrated powder, flakes and paste prepared out of onion provide rich agro-industrial base for these commodities. Onion can be grown under a wide range of climatic condition [3][4] but succeeds best in mild season without extremes of heat and cold. Successful onion production depends on the selection of varieties that are adapted to different climatic conditions. The researchers [5][6] revealed that transplanting of onion in 15x10cm geometry recorded maximum plant height (30.87cm) which was statistically at par with 10x10cm crop geometry (28.93) but significantly different from 10x7.5cm (24.87cm).

1.1 Need of The Study

No systematic study has been conducted to assess the suitability of onion cultivation Uttarakhand,[7] for which standardization of varieties is of immense utility. Hence, the present experiment was conducted to study the response of some improved varieties of onion (Allium cepa L. var. cepa) for their suitability for cultivation in peri-urban area of Dehradun.

1.2 Population and Sample

The study was conducted among120 farmers selected through random sampling method along with key informants' interviews and personal observations.

1.3 Data and Sources of Data

For this study secondary data has been collected from the Department of Horticulture and census of India. The primary data were collected form the farmers of Dehradun. Interview schedule was developed and pretested. Perception of the farmers on the onion variety, hindrances in adoption, knowledge, training of cultivation, storage skill was recorded through administering the interview schedule, key informant interview and personal observation.

1.4 Theoretical framework

Variables of the study contains dependent and independent variable. The study used pre-specified method for the selection of variables.

II. RESEARCH METHODOLOGY

The methodology section outline the plan and method that how the study is conducted. Data and Sources of Data (primary and secondary data), study's variables and analytical framework (maximum, minimum, standard deviation, mean and normally distribution).The details are as follows:

2.1Population and Sample

This includes Universe of the study (District: Dehradun) and sample of the study (120 farmers).

2.2 Data and Sources of Data

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE - 100 Index is taken from yahoo finance.

2.3 Theoretical framework

Variables of the study contains dependent and independent variable. The study used pre-specified method for the selection of variables. The study used the purposive cum random sampling method to select the respondents of the study.

2.4 Statistical tools and econometric models

This section elaborates the proper statistical models which are being used to forward the study from data towards inferences. The detail of methodology is given as follows.

Descriptive Statics has been used to find the maximum, minimum, standard deviation, mean and normally distribution of the data of all the variables of the study. After collection of the completed interview schedule, the data will be tabulated and analyzed through statistical tools. To get the overall view of adoption level the respondents were divided into three groups on the basis of calculated mean and SD of the adoption scores obtained by therespondents. The data were analyzed, tabulated andinterpretations were made in the light of objectivesof study. Suitable statistical measures like mean, percentage, standard deviation, "Z" test, rank ordercorrelation were used in this study.

III. RESULTS AND DISCUSSION

3.1 Demographic profile of the respondents

The most (90.83%) of those completing the questionnaire were male and about half of the total respondents (49.16%) were middle age old (26-50 years). Majority of the respondents (55%) had intermediate and graduate level education (Table 3.1)..

Table 3.1: Distribution of respondents on the basis of their level of education level (N=120)

S. No.	Description	Number	Percentage
1	Up to High School	36	30
2	Intermediate to Graduate	66	55
3	Post Graduate	18	15
	Total	120	100

The most of respondents (90.83%) were male and half of the respondents (49.16%) were of middle age group. Majority of the respondents (55%) had intermediate and graduate level education. 100% respondents were belong to small and marginal land holding category, growing onion for domestic purposes and not received any training on nursery raising of onion or cultivation of onion. Majority of the respondents (62.5%) have farming experience more than 6 years and more than half of the respondents (55.83%) had their income from farming.

3.2 Physiological attributes of onion in the area of the study

3.2.1 Yield and yield-attributing characters of Onion

The physiological attributes of the study neck thickness, crop duration, equatorial diameter, polar diameter, average weight of bulb and bulb yield were recorded for the three different varieties on onion. Table 3. 2 shows the Vivek Pyaz 3 with a highest yield of 259.5 q/ha in 175 days. The size of bulb was also biggest with 71.8 g per bulb for it over the Agrifound light red and local onion variety.

Table 3.2: Yield and yield-attributing characters of Onion

Variety	Neck Thickness (cm)	Crop Duration (Days)	Equatorial diameter (cm)	Polar Diameter (cm)	Average weight of bulb(g)	Bulb yield (q/ha)
Agrifound Light Red	0.88	160	4.8	4.3	68.5	229.6
Vivek Pyaz3	1.62	175	4.7	5.1	71.8	259.5
Local	0.45	180	2.8	3.4	55.3	172.5

3.2.2 Grading percentage of bulb yield

The grade percent data in Table 3.3 shows that Vivek pyaz 3 hacs maximum grading under A grade and local variety has maximum grading percentage under C grade.

Table 3.3: Grading percentage of Bulb yield.

Grade %	A Grade (> 6.5 cm)	B Grade (5.5-6.5 cm)	C Grade (4.5-5.5 cm)
Agrifound Light Red	42.56	33.56	29.57
Vivek Pyaz3	49.57	32.46	27.58
Local	32.74	29.78	38.67

3.2.2 Yield and economics of different varieties

The B:C ratio envisages the Vivek Pyaz 3 as the most economic variety of onion with 2.84 B:C ratio whereas, the economics also revealed that Agrifound Light Red is also comparable with 2.46 B:C ratio.

Table 3.4: Yield and economics of different varieties of onion.

Variety	Total Yield (q/ha)	Gross Return (Rs.)	Cost of Cultivation (Rs.)	Net return (Rs.)	B:C Ratio
Agrifound Light Red	229.6	1,60,720	46,400	1,14,320	2.46
Vivek Pyaz3	259.5	1,81,650	47,300	1,34,350	2.84
Local	172.5	1,03,500	39,000	64,500	1.65

3.3 Behavioral attributes of onion in the area of the study

3.3.1 Adoption of onion Production Technology

The data in the Table 3.3 shows adoption percentage of onion (Allium cepa L.) production technology demonstrated by the scientist through various educational tools and demonstrations. The adoption level was medium with 55%, under low adoption there were 30% of the respondents and 15 % showed high level of adoption.

Table 3.5: Adoption of Onion (Allium cepa L.) Production Technology (N=120)

S. No.	Level of Adoption	Peripheral Farmers		Distant Farmers		Total	
		F	%	F	%	F	%
1	Low	10	20	20	40	30	30
2	Medium	29	58	26	52	55	55
3	High	11	22	4	8	15	15
	Total	50	100	50	100	50	100

3.3.2 Adoption of onion storage method

The Table 3.3 explains method opted for onion storage. The storage on open floor with 84.16 % farmers was the most preferred method followed by the storage by hanging with roof (8.33%), then storage in perforated bags (5.83%) and lastly storage on Planks (1.66%).

Table 3.6: Description of method opted for onion storage (N=120)

S. No.	Description	Farmers	
		F	%
1	Storage on open floor	101	84.16
2	Storage by hanging with roof	10	8.33
3	Storage on Planks	2	1.66
4	Storage in perforated bags	7	5.83
	Total	120	100

3.3.3 Farmers' Perception towards Onion production and storage technology

The ranking of onion varieties based on the perception of the farmers are presented in Table 5, which indicates Agri found Light Red variety as the most preferred onion variety compared to Agri found Light Red and Local varieties. The farmers perceived and ranked Agri found Light Red variety number one as this variety produced good size of bulbs, attractive shape, colour, better yield and market preference. (Table 3.7)

Table 3.7: Varietal performance and farmers' perception on various characters of onion.

Variety	Size	Shape	Colour	Skin	Yield	Market Preference	Seed Availability	Total	Ranking
Agrifound Light Red	2	1	3	2	2	3	3	16	II
Vivek Pyaz3	1	1	1	2	1	1	4	11	I
Local	5	5	4	4	4	5	1	28	III

Preference scale: 1-6 (1- highest preference, 6 lowest preference)

Agri found Light Red was ranked number two among the varieties studied. While Local variety (Lalima) recorded the lowest preference because farmers did not appreciate its size, shape, colour, skin, lower yield, and market preference along with its nature of susceptibility to purple blotch and proneness to damping off disease. However based on seed availability for current season crop production, the local variety (*Lalima*) ranked number one, compared to other two varieties as these varieties still needs to be introduced into seed chain in the area. Similar evaluation of onion varieties for productivity performance was reported in Botswana (Southern Africa) [8].

III. CONCLUSIONS

The results of different varieties tested for cultivation in *Rabi* season revealed that the variety Agri found Light Red is widely adopted for cultivation during *Rabi* season. Behaviour of the farmers resulted to be a decisive factor towards its varietal adoption. Behaviour is perceived as a mirror image because of its higher yield, varietal performance and market preference.

IV. ACKNOWLEDGMENT

REFERENCES

[1] Mohanty B K and Prusti A M. 2001. Performance of common onion varieties in kharif seasons J Trop Agri 39: 21-23

[2] Tripathy P, Priyadarshini A, Das S K, Sahoo B B and Dash D K. 2013. Evaluation of onion (Allium cepa L.) genotypes for tolerance to thrips (Thrips tabaci L.) and purple blotch [Alternaria porri (Ellis) (Iterri)]. Int J Bioresource & Stress Manage 4(4): 561-564.

[3] Singh L, Singh S P and Mishra P K. 1991. Evaluation of onion varieties at Karnal. AADF Newsletter. XI,3: 3-4.

[4] Kerure P, Chandrappa D, Salimath S, Rudragouda F, Chandragouda S, Onkarappa and Gajendra T H (2016). Varietal assessment in onion for higher productivity and quality. In: 1st KVK Symposium zone VIII, held at UAS, Dharwad from 21-22, January pp 85.

[5] Pandey U B. 1989. Onion (Allium cepa L.) Varietal trial, Indian Horticulture, 33:58-62.

[6] Mahala P, Jaidka M, Sharma M and Brar N S. 2019. Effect of crop geometry on growth and yield of kharif onion. J Krishi Vigyan 7 (2) : 267-269

[7] Anonymous. 2018. Database of Horticultural Crops. District Horticulture Department, Lalitpur (U.P.)

[8] Baliyan Som Pal. 2014. Evaluation of onion varieties for productivity performance in Botswana.World J Agri Res 2 (3) : 129-135.