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Research Article

ACREAGE RESPONSE OF POTATO AND EFFECT OF FACTORS IN LOWER BRAHMAPUTRA VALLEY ZONES OF ASSAM

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ABSTRACT

Potato is one of the most important and widely cultivated vegetable crops of Assam and ranks fourth in terms of acreage under individual crop in the state. Lower Brahmaputra valley Zone of Assam which comprised the district Dhubri, Goalpara, Kokrajhar, Chirang, Bongaigaon, Barpata, Nalbari, Baksa, Kamrup rural and Metro has recorded highest percentage (47.49%) of area under potato in the state of Assam. Growth rate of area of potato crop was found positive and significant for Barpeta (1.43) and Kokrajhar district (1.42) of the zone during the period from 1985 to 2010. The co-efficient of lag area of potato crop was found to be positively significant in Barpeta**,** Goalpara, Dhubri and Nalbari districts of LBVZ of Assam. The co-efficient of previous year's yield was observed to be positively significant for Goalpara district in linear model. On the other hand co-efficient of previous year's yield was observed to be negatively significant for Dhubri district both in linear and log-linear model of analysis. But the impact of previous year's yield had not influenced farmers to switch over for cultivation of other crops to derive more benefit, as the previous year's production of potato was significantly positive in Dhubri district. The co-efficient of previous year's production was observed to be positively significant for Dhubri district both in linear and log linear model of analysis. It was reflected from the study that with significant increase in potato production per unit area, the farmers had incorporated more area under the crop to derive more benefit. The co-efficient of Lag farm harvest price was not found to be significant for any of the districts as well as for the zone as a whole. The short run and long run price elasticities were found to be negative in four districts, viz., Barpeta, Kamrup, Nalbari and Kokrajhar district. While for Bongaigaon and Goalpara districts short run price elastic ties were found to be positive and long run price elasticises were found to be negative for both the districts.

INTRODUCTION

Potato (*Solanum tuberosum* L.) has emerged as fourth most important food crop in India after rice, wheat and maize. Potato cultivation is highly adaptable to a wide variety of farming systems. With its short vegetative cycle and high yields within 100 days, it fits well into double cropping systems with rice, and is also suitable for intercropping with maize and soybeans. India's potato production has seen a phenomenal increase since the 1950s, mainly due to strong demand from the processing industry and remunerative returns. According to the Central Potato Research Institute (CPRI), the area under potato rose by almost 547 per cent since the 50s, while yield rose by 267 per cent and overall output jumped by 146 per cent. It produces 74.5 and 58.0 per cent more food energy and 54.0 and 77.6 per cent more protein per unit area than wheat and rice respectively (Lisinska and Leszezynski, 1989).

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India produced 42.34 million tons from 1.86 million ha with an average yield of 22.72 t/ha of potato during 2010 to 2011 (Agricultural Statistics at a Glance, 2012). Potato is an important crop in the North Eastern Region in India especially in the hilly tracts, where the crop is grown under rain fed conditions. The crop is grown throughout the year in one or the other part of the North Eastern region contributing about 10 per cent of the total area under potato in the country (Gupta *et al.,* 2004). The said crop forms an important part of prevailing cropping systems (Kumar *et al.,* 2006) as well as the dietary food habits of the people of the region. Potato is one of the most important and widely cultivated vegetable crops of Assam and ranks fourth in terms of acreage under individual crop in the state. Bhattacharyya *et al.* (2001) reported that in Assam the potato acreage has increased by 222.65 per cent in 1997-98 from 1962-63. However, the yield is very low in the state (only 8 t/ha against national average of 19 t/ha). As a result it has to import potato from neighbouring states like West Bengal, Meghalaya and even U.P and Punjab every year owing to the huge gap between demand and supply.

Though a number of studies have been carried out on acreage response of different crops both at micro and macro levels, the studies of acreage response of potato crop in Lower Brahmaputra Valley Zones of Assam is a new study. This type of studies are not only relevant for clear understanding of growth trends and magnitude of fluctuations in acreage, production and productivity of potato but are also useful for scientific planning and effective implementation of development programme on potato crop at district level. In the context of the above discussion, the present study aim to focus on the acreage response of potato and factors effecting it in Lower Brahmaputra Valley Zones of Assam**.** It is an attempt to examine whether the production of potato has influenced the growers in the zone owing to changes in prices and selected non-price variables. Area, production and productivity of the crop are remaining almost stagnant for the last few years. The increase production of the crop in the state has immense importance on the household economy of Assam.

MATERIALS AND METHODS

The aim of the present study is to analyze the Acreage response of potato and factors effecting it in Lower Brahmaputra Valley Zones of Assam (LBVZ). The study conducted in the Lower Brahmaputra Valley Zones of Assam based on primary as well as secondary data pertaining to the Agricultural year 2012-14. Secondary data were collected from various sources like Department of Agriculture, Offices of Agricultural Marketing, Assam State Agricultural Marketing Board, Directorate of Economics and Statistics and various published and unpublished sources.

Supply Response Analysis

Like most of the supply response studies Nerlovian partial adjustment lag model was selected for the present study. The primary consideration for preferring adjustment lag model to expected lag model relates to the estimation problems in the later. Moreover, the merit of adjustment lag model facilitates the estimates of short run and long run elastic ties directly.

Nerlovian partial adjustment lag model

In the Nerlovian framework, the long-run desired supply (A_t^*) is assumed to be related to the price ($P_{t)}$ in a simple linear manner.

$$A_t^* = a_0 + a_1 P_{t-1} + U_t$$

Variations in At^* is related to variation in observed or actual supply by assuming the following relationship between the actual and long run desired level of supply.

$$A_t - A_{t-1} = b\,(A_t^* - A_{t-1}) + V_t, \quad 0 < b < 1$$

The current supply A_t is then

$$A_t - A_{t-1} = b\,(A_t^* - A_{t-1}) + V_t$$

Where

A_t = Actual acreage in current year
A_{t-1}= Actual acreage in preceding year
b = co-efficient of adjustment
V_t = Random term

By substituting the above formulations yield an estimating equation in the following form.

$$A_t = b_0 + b_1 P_{t-1} + b_2 A_{t-1} + v_t$$

The general form of the model used in the present study was as follows

$$A_t = f\,(A_{t-1,}\, Y_{t-1,}\, FHP_{t-1,}\, FHP^{c}_{t-1,}\, P_{d-1,}\, W_{t,}\, Y_R\, P_R\, W_R\, t)$$

Where,

A_t = Area under the crop in time t (000 ha)
A_{t-1}= One year lagged acreage under the crop (000 ha)
Y_{t-1}= Productivity of the crop in the preceeding year (kg/ha)
FHP_{t-1}= Farm harvest price of the crop in preceeding year (Rs./qt).
FHP^{c}_{t-1} = Farm harvest price of the competing crop in preceeding year (Rs./qt).
P_{d-1} = One year lagged production (tonnes)
W_t = Weather variable as three months' average pre-sowing rainfall (mm)
Y_R = Yield Risk (coefficient of variation of past three years' yield of the crop).
P_R = Price Risk (coefficient of variation of past three years' farm harvest price of the crop)

W_R = Weather risk (coefficient of variation of past three years' average three months pre-sowing rainfall)

t = time variable as a proxy for technological improvement (t = 1,2,3.....n)

Both linear and log linear multiple regression model of the following types have been tried and the best fitted model was selected for discussion.

Linear model

$$A_t = b_0 + b_1 A_{t-1} + b_2\, Y_{t-1} + b_3\, FHP_{t-1} + b_4\, FHP^{c}_{t-1} + b_5\, P_{d-1} + b_6 W_t + b_7 Y_R + b_8 P_R + b_9 W_R + b_{10} t + U_t$$

Log linear model:

$$\log A_t = b_0 + b_1 \log A_{t-1} + b_2 \log Y_{t-1} + b_3 \log FHP_{t-1} + b_4 \log FHP^{c}_{t-1} + b_5 \log P_{d-1} + b_6 \log W_t + b_7 \log Y_R + b_8 \log P_R + b_9 \log W_R + b_{10} \log t + U_t$$

Estimation of short-run and long run price elasticity

The short-run and long run price elasticity could be estimated from both linear and log linear model.

From linear model the price elasticities could be computed as follows:

$$\text{Short-run elasticity (SRE)} = \text{Regression co-efficient of price} \times \frac{\text{Mean price}}{\text{Mean of area}}$$

$$\text{Long run elasticity (LRE)} = \frac{\text{SRE}}{\text{Coefficient of area adjustment(r)}}$$

Where, r = 1-coefficient of lagged area

In log linear model the coefficient of farm harvest price yielded short run price elasticity directly. Then the long run price elasticity could be estimated as given below:

$$\text{Long run elasticity (LRE)} = \frac{\text{SRE}}{\text{Coefficient of area adjustment(r)}}$$

Where, r = 1-coefficient of lagged area

In the present study the price elasticities were computed from the log linear model as this model appeared to be the best fitted.

Estimation of Growth rates by exponential trend equation

Compound growth rates of area, production and yield of the potato crop was computed for all the districts (undivided) of Brahmaputra Valley Zones of Assam and for the state as a whole by fitting the exponential function.

The exponential functional form is

$y_t = ab^t$
Or logyt = log a + t log b

The CGR was worked out as,

r = (antilog 'b' -1) × 100
Where, y_t= Area / Production/ Yield of potato
a = Intercept
b = Regression co-efficient
t = Time period in year
The significance of growth rate was tested by applying student 't' test and the same was compared with the factorial value of 't' from standard value of 't' distribution.

$$t = \frac{R}{S.E\,(r)} \quad \text{With } (n\text{-}2) \text{ d.f}$$

RESULTS AND DISCUSSION

Zone wise distribution of districts and share of potato area and production

Table 1 represents the Zone-wise distribution of districts and share of potato area and production. It was observed from the Table that North Bank Plain Zone was found densely populated with 388 persons per sq.km. and the Lower Brahmaputra valley Zone was observed as the thinly populated zone among the four zones of Assam with only 225 persons per sq. km. The agro-ecological zones are highly diverse and hence the pattern of adaptation of crop production system differs across the zones. Table also reflected the Zone-wise distribution of districts and share of potato area and production in the Brahmaputra Valley Zone of Assam. Total area under the potato crop among all the four Zones was 58706 ha. From the Table it was reflected that North Bank Plain Zone Contributed highest percentage of potato area (41.95%) in Assam. Likewise, Lower Brahmaputra valley Zone, Central Brahmaputra Valley Zone and North Bank Plain Zone contributed 34.38 per cent, 9.19 per cent and 14.46 per cent, respectively. On the other hand highest percentage of potato Production among all the four zones of Assam was recorded highest for the Lower Brahmaputra valley Zone contributing (47.49%) and the lowest was observed for Central Brahmaputra Valley Zone (8.28%). The average rainfall pattern is also highly variable ranging from 1700 mm in the LBVZ to the highest rainfall of 2650 mm in the Central Brahmaputra Valley Zone.

District-wise and zone-wise growth rate of area production and average yield of Potato for the year 1985 to 2010

Table 2. exhibits the district-wise and zone-wise growth rate of area production and yield of Potato in Brahmaputra Valley zones of Assam for the period 1985-2010. It was observed from the table that during the last twenty-sixth years the growth rate of area of the potato crop was found positive and significant for Barpeta (1.43) and Kokrajhar district (1.42) of Assam. This indicated that area allocation under the potato crop was found increasing in both the districts of LBVZ of Assam. On the other hand Goalpara (-2.56), Kamrup (-1.43) and Nalbari (-1.87) districts of LBVZ, Dibrugarh (-5.32) and Jorhat (-2.53) district in UBVZ was recorded for negative and significant growth rate of area under the crop during the period.

The negative and significant growth of area under the crop indicated that farmers were incorporating less area under the crop then the earlier years. The growth rate of potato production was found positive and significant for Kokrajhar district (2.63) which indicated that with increase production, area under the crop increases simultaneously in the district. On the other hand negative and significant production of potato was recorded for Nalbari district (-2.08) in LVBZ, Dibrugarh (-4.18) and Jorhat (-3.95) districts in UBVZ and Lkhimpur district (-0.15) in NBPZ of Assam. This indicated that due to reduce production farmers were shifted to some other competing crops in the districts. Similarly for the growth rate of yield of potato crop was found positive and significant for Dhubri district (2.00) in LBVZ, Dibrugarh district (1.21) in UBVZ, Darrang (2.22) and Sonitpur (1.38) districts in NBPZ and Nagaon district (1.99) in CBVZ of Assam. This was due to the fact that with increase use of high yielding varieties and recommended doses of fertilizers yield of the crop increases over the years.

Acreage response of Potato for selected districts in LBVZ of Assam, 1981-2011

Lag acreage (A*t-1)

The co-efficient of lag area of potato crop was found to be positively significant in Barpeta**,** Goalpara, Dhubri and Nalbari districts of LBVZ of Assam. Here Dhubri district had shown significant status in both the linear and log-linear model in the analysis. Whereas, Barpeta and Goalpara districts were found to be significant for lag area in linear analysis only. Likewise, Nalbari was found significant for log-linear model in the selected period. Analysed data reflected that with increase in area under the crop in the previous years, had significant impact on acreage allocation decision of the farmers under potato crop in the current year. For the rest of the district's the coefficient of the lag area of potato crop was not found to be significant which indicated that there was no significant impact of the lagged area on the acreage allocation decision of the farmers under potato cultivation in the current year.

Table 1. Zone-wise distribution of districts and share of potato area and production

Zone	District	Rainfall (mm)	Area (ha)	Production (tonnes)	Population density (per sq.Km.)
Lower Brahmaputra valley Zone	Barpeta Bongaigaon Goalpara Dhubri Kamrup Nalbari	1778-2347	20187 (34.38)	240566 (47.49)	225
Upper Brahmaputra Valley Zone	Tinisukia Sibasagar Jorhat Golaghat Dibrugarh	2650	8490 (14.46)	52243 (10.31)	241
North Bank Plain Zone	Darrang Lakhimpur Dhemaji Sonitpur	1700	24630 (41.95)	171781 (33.91)	388
Central Brahmaputra Valley Zone	Morigaon Nagaon	2000	5399 (9.19)	41950 (8.28)	302
Total			58706 (100)	506540 (100)	

(Figure in the parenthesis showing the percentage to total)

Table 2. District-wise and zone-wise growth rate of area production and average yield of Potato for the year 1985 to 2010

District	Area (ha)	Production (tonnes)	Yield (tonnes/ha)
Barpeta	1.43***	1.02	-0.40
Goalpara	-2.56***	-2.18	0.38
Dhubri	-0.47	-0.19	2.00***
Kamrup	-1.43***	1.00	2.47
Nalbari	-1.87**	-2.08***	-0.21
Kokrajhar	1.42***	2.63***	1.18
LBVZ	0.09	0.77	0.78
Dibrugarh	-5.32**	-4.18***	1.21***
Jorhat	-2.53***	-3.95**	-1.46***
Sibasagar	-0.39	-0.40	-0.02
UBVZ	1.09***	0.25	0.12
Darrang	-0.19	2.02	2.22**
Lakhimpur	-0.03	-0.15*	-0.11
Sonitpur	2.58	3.99	1.38***
NBPZ	2.34	3.34	0.70***
Nagaon	-0.64	1.34	1.99***
CBVZ	0.15	2.00***	1.22

Source: Directorate of Economics & Statistics, Assam
(All the undivided districts were selected to analyse the growth trends)
*Significant at 10 per cent probability level
** Significant at 5 per cent probability level
***Significant at 1 per cent probability level

Lag Yield (Yt-1)

The co-efficient of previous year's yield was observed to be positively significant for Goalpara district in linear model analysis. This indicated that the increase of previous year's yield the farmers were incorporated more land under the potato crop to derive more benefit. On the other hand co-efficient of previous year's yield was observed to be negatively significant for Dhubri district both in linear and log-linear model of analysis. But the impact of previous year's yield had not able to switch over the farmers for cultivation of other crops to derive more benefit, as the previous year's production of potato was significantly positive in Dhubri district. For rest of the districts as well as for the zone as a whole, the coefficient of the variable was not found to be significant which revealed that there was no significant impact of the lagged yield on the acreage allocation decision of the farmers under potato cultivation in the current year.

Lag production (Pd-1)

The co-efficient of previous year's production was observed to be positively significant for Dhubri district both in linear and log linear model of analysis. It was reflected from the study that with significant increase of potato production per unit area, the farmers had incorporated more area under the crop to derive more benefit. On the other hand the co-efficient of previous year's production was observed to be negatively significant for the Goalpara district. But the previous year's yield was observed to be positively significant, which had significant impact in acreage allocation under the potato crop in the current years. For the rest of the districts as well as for the zone as a whole, the coefficient of the variable was not found to be significant which revealed that there was no significant impact of the Lag production on the acreage allocation decision of the farmers under potato cultivation in the current year.

Table 3. Estimates of the acreage response of Potato for selected districts in LBVZ of Assam, 1981-2011

Districts	Form of equation	Intercept	One year lagged acreage under the crop (A*t-1)	One year lagged yield of the crop (Yt-1)	Weather variable as three months average pre sowing rainfall (W_1*t)	One year lagged production (Pd-1)	One year lag farm harvest price (Pt-1)	One year lag farm harvest price of competing crop (P^ct-1)	Yield Risk (Yr)	Price risk (Pr)	Weather risk (Wr)	Time variable as proxy (t)	R^2
Barpeta	Linear	2836	0.38***	96.39	5.76	0.002	-0.69	-2.45	0.48	18.66	67.47	28.41	0.67
		(4969.68)	(0.19)	(178.46)	(5.05)	(0.01)	(2.47)	(4.05)	(41.22)	(39.39)	(74.00)	(117.96)	
	Double log	7.64**	-0.03	0.17	0.23	-0.05	-0.10	-1.47***	-0.004	0.20***	0.05	0.33***	0.80
		(2.07)	(0.18)	(0.16)	(0.23)	(0.05)	(0.16)	(0.55)	(0.05)	(0.08)	(0.12)	(0.15)	
Bongaigaon	Linear	-18554.1	12.16	3640.69	-6.03	-1.27	3.34	-5.66	80.28	-133.21	-139.78	79.52	0.93
		(25354.29)	(14.62)	(4947.72)	(9.46)	(1.68)	(3.15)	(8.57)	(54.29)	(138.93)	(86.84)	(514.53)	
Goalpara	Linear	-3867.64***	2.67*	549.06***	-0.27	-0.23*	1.33	0.41	6.41	5.15	-3.64	-66.62	0.67
		(1691.18)	(0.57)	(198.89)	(1.77)	(0.06)	(1.91)	(0.98)	(15.45)	(17.49)	(15.09)	(54.20)	
	Double log	1.01	31.03	30.02	-0.07	-30.69	0.32	0.33	0.17	-0.09	0.05	-0.24	0.58
		(1.47)	(24.70)	(24.07)	(0.32)	(24.44)	(0.47)	(0.57)	(0.11)	(0.16)	(0.18)	(0.34)	
Dhubri	Linear	3318.17***	0.442927***	-170.183***	0.31	0.04**	0.31	-1.58	-8.63	6.62	5.23	45.49	0.85
		(1221.482)	(0.1681)	(59.58)	(1.006)	(0.01)	(1.08)	(1.07)	(7.10)	(14.99)	(13.51)	(34.90)	
	Double log	1.50	0.59**	-0.22**	0.03	0.21**	0.03	-0.33	-0.02	0.007	0.0007	0.08	0.82
		(0.92)	(0.18)	(0.07)	(0.08)	(0.07)	(0.11)	(0.20)	(0.03)	(0.04)	(0.035)	(0.05)	
Kamrup	Linear	5111.339	0.23	119.94	2.09	0.003	-1.56	-2.89***	13.17	-14.99	-38.37	165.21***	0.75
		(3269.92)	(0.63)	(512.37)	(6.18)	(0.088)	(2.98)	(1.02)	(35.76)	(20.96)	(39.88)	(90.20)	
	Double log	4.39***	94.27	94.09	0.05	-94.01	-0.09	-0.59***	0.09	-0.02	-0.07	0.19	0.68
		(1.75)	(168.12)	(168.17)	(0.30)	(168.29)	(0.28)	(0.22)	(0.13)	(0.09)	(0.13)	(0.13)	
Nalbari	Linear	2445.744	0.75	131.03	-0.01	-0.04	-0.91	-0.64	-10.21	-21.22***	-2.18	49.05	0.86
		(2984.27)	(0.84)	(377.88)	(1.20)	(0.10)	(0.88)	(0.52)	(15.71)	(7.39)	(11.40)	(47.53)	
	Double log	4.33***	56.74***	56.42	0.14	-56.46	-0.26	-0.41	-0.05	-0.11***	-0.07	0.15	0.81
		(1.93)	(165.73)	(165.82)	(0.22)	(165.85)	(0.20)	(0.29)	(0.10)	(0.06)	(0.09)	(0.11)	
Kokrajhar	Linear	1365.44	0.32	79.25	0.29	-0.002	-0.80	0.53	-19.89	-19.11	-12.87	40.68	0.43
		(3690.55)	(1.46)	(380.06)	(1.90)	(0.16)	(1.13)	(1.59)	(15.24)	(27.28)	(29.07)	(108.53)	
	Double log	1.58	4.94	4.86	0.002	-4.56	-0.22	0.34	-0.09	-0.09	-0.02	0.06	0.55
		(2.23)	(17.81)	(17.79)	(0.35)	(17.81)	(0.21)	(0.36)	(0.07)	(0.16)	(0.08)	(021)	
Pooled LBVZ	Linear	908.87***	0.90	0.19	0.37	0.0005	0.09	-0.25	-0.83	3.45	-9.06	-3.22	0.87
		(494.31)	(0.04)	(0.16)	(0.63)	(0.004)	(0.55)	(0.23)	(7.45)	(6.17)	(8.33)	(1.99)	
	Double log	0.48	0.91	0.09	0.04	-0.0001	-0.01	-0.09	-0.02	0.04	0.01	-0.03	0.91
		(0.34)	(0.03)	(0.03)	(0.07)	(0.04)	(0.08)	(0.08)	(0.03)	(0.03)	(0.03)	(0.02)	

Figure in the parentheses indicate value of standard error
*Significant at 10 per cent probability level
** Significant at 5 per cent probability level
***Significant at 1 per cent probability level

Lag farm harvest price (Pt-1)

The co-efficient of Lag farm harvest price was not found to be significant for any of the district as well as for the zone as a whole, which indicated that there was no significant impact of lagged farm harvest price on the acreage allocated decision of the farmer under potato crop in the current year.

Lag farm harvest price of competing crop (P^ct-1)

The co-efficient of Lag farm harvest price of competing crop was observed to be negatively significant for Barpeta district in log linear model of analysis. Similarly, for Kamrup district, co-efficient of Lag farm harvest price of competing crop was

observed to be negatively significant both in linear and log-linear model which indicated that with increase of previous year's farm harvest price of competing crop the farmers would have switched over to that crop to derive more benefit. For the rest of the districts as well as for the zone as a whole, the coefficient of the variable was not found to be significant for the Lag farm harvest price of competing crop which revealed that there was no significant impact of the Lag farm harvest price of competing crop on the acreage allocation decision of the farmers under potato cultivation in the current year.

Weather variable (W_1*t)

The co-efficient of weather variable was not found to be significant for any of the district as well as for the zone as a whole, which indicated that there was no significant impact of pre sowing rainfall on the acreage allocation decision of the farmer under potato crop in the current year.

Table 4. Estimated short-run and long-run price elasticities of acreage response of Potato for selected districts in LBVZ of Assam 1981-2011

District	Short-run price elasticity	Long-run price elasticity
Barpeta	-0.04	-0.07
Bongaigaon	0.79	-0.07
Goalpara	0.48	-0.29
Dhubri	0.03	0.06
Kamrup	-0.13	-0.17
Nalbari	-0.13	-0.55
Kokrajhar	-0.15	-0.22
Pooled LBVZ	0.01	0.10

Yield Risk (Yr)

The co-efficient of the variable was not found to be significant for any of the district as well as for the zone as a whole, which indicated that there was no significant impact of Yield Risk of the crop on the acreage allocation decision of the farmer under potato crop in the current year.

Price risk (Pr)

The potato growers in the Barpeta district was observed to be inclined to bear risk due to price factor as it was revealed by the positive as well as significant status of the regression co-efficient of the variable. The co-efficient of this variable was observed to be negatively significant both in linear and log-linear model in Nalbari district which reflected the high risk adverse behaviour of the potato growers as far as the price factor concerned.

Weather risk (W_r)

The regression variable of weather risk variable was not found to be significant for any of the district as well as for the zone as a whole, which indicated that there was no significant impact of bearing risk due to weather factor on the potato crop in acreage allocation decision of the farmer in the current year.

Time variable (t)

The co-efficient of the 'time' variable used as a catch on all variable to take care of the gradual changes in quality of inputs and in technique of production was found to be significant in Barpeta and Kamrup district which indicated that with the gradual change in quality of inputs and technique of production the acreage under potato crop would have increased considerably.

From the above discussion it was observed that the co-efficient of lag acreage variable in Barpeta, Goalpara, Dhubri and Nalbari district; lag Yield in Goalpara district; lag production in Dhubri district; Price risk in Barpeta district; time variable in Barpeta and Kamrup district were found to be positive as well as statistically significant. Moreover, the regression co-efficient of lag Yield in Dhubri district; lag production in Goalpara district; lag farm harvest price of competing crop in Barpeta district; Price risk in Nalbari district were observed to be negative and referred to be statistically significant. But for the rest of the district the co-efficient of none of the price as well as no-price factors were observed to be statistically significant indicating that no factor included in the model could effect individually the current year's acreage under the crop.

Short-run and long-run price elasticities of acreage response of Potato for selected districts in LBVZ of Assam 1981-2011

The short run as well as long run price elasticities were computed for all the districts and also for the zone as a whole (Table 4). The short run and long run price elasticities were found to be negative in four districts, *viz.*, Barpeta, Kamrup, Nalbari and Kokrajhar district. It indicated that one rupee increase in price of potato would have decreased the area under the crop in Barpeta district, Kamrup district, Nalbari district and Kokrajhar district by 0.04 and 0.07 hectares, 0.13 and 0.17 hectares, 0.13 and 0.55 hectares and 0.15 and 0.22 hectares in short run and long run respectively. While for Bongaigaon and Goalpara districts short run price elasticities were found to be positive and long run price elasticities were found to be negative for both the districts. Whereas, for the entire zone both the elasticities recorded were positive.

Conclusion and Policy Implications

The results obtained from the present study conducted with a view to analyze the Acreage response of potato and factors effecting it in Lower Brahmaputra Valley Zones of Assam reflected that among all the zones of Assam, Lower Brahmaputra valley Zone is recorded for highest contribution (47.49%) of potato production. It was observed from the table that during the last twenty-sixth years the growth rate of area of the potato crop was found positive and significant for Barpeta (1.43) and Kokrajhar district (1.42) of the zone. On the other hand negative and significant production of potato was recorded for Nalbari district (-2.08). The co-efficient of lag area of potato crop was found to be positively significant in Barpeta**,** Goalpara, Dhubri and Nalbari districts of LBVZ of Assam. This reflected that with increase in area under the crop in the previous years, had significant impact on acreage allocation decision of the farmers under potato crop in the current year. The co-efficient of previous year's yield was observed to be positively significant for Goalpara district in linear model analysis. On the other hand co-efficient of previous year's yield was observed to be negatively significant for Dhubri district both in linear and log-linear model of analysis. But the impact of previous year's yield had not able to switch over the farmers for cultivation of other crops to derive more benefit, as the previous year's production of potato was significantly positive in Dhubri district. The co-efficient of previous year's production was observed to be positively significant for Dhubri district both in linear and log linear model of analysis.

It was reflected from the study that with significant increase of potato production per unit area, the farmers had incorporated more area under the crop to derive more benefit. The co-efficient of Lag farm harvest price was not found to be significant for any of the district as well as for the zone as a whole. The co-efficient of the 'time' variable used as a catch on all variable to take care of the gradual changes in quality of inputs and in technique of production was found to be significant in Barpeta and Kamrup district which indicated that with the gradual change in quality of inputs and technique of production the acreage under potato crop would have increased considerably. The short run and long run price elasticities were found to be negative in four districts, *viz.*, Barpeta, Kamrup, Nalbari and Kokrajhar district. While for Bongaigaon and Goalpara districts short run price elasticities were found to be positive and long run price elasticities were found to be negative for both the districts.

The main policy implications includes

- Negative coefficient for price risk factor was noticed in almost all the district. Hence the risk arising out of price needs to be arrested by adopting suitable price stabilization mechanisms.
- The supply response analysis revealed that, with an increase in the expected price of potato crop tended to increase the production of crop mainly by bringing more area under its cultivation. Hence in order to enhance the production of potato in the state, the price policy of the government may aim at providing remunerative prices to the potato growers.
- Lack of knowledge of farmers in identification of various diseases and pests and their control arose the necessity of intervention of extension authorities in educating the farmers through field visits and demonstrations.

REFERENCES

Anwarul Huq, A.S.M. and Arshad, F.M. 2010. Supply response of potato in Bangladesh: A vector error correction approach. *J. Appl. Sci*. 10: 895-902.

Arun, P.; Pandey, N.K.; Rana Rajesh, K.; Kumar, N.R. and Chandran, K.P. 2005. Input use pattern and factors affecting potato yield in Barpeta district of Assam. *Potato J*. pp. 253.

Bhattacharyya, H.C., Borkakoti, K. and Saikia, R.S. 2001. *In:* Agriculture in Assam. Thakur, A.C.; Bhattacharya, A. and Sharma, D.K. (eds.). Dir. of Extn. Education, Assam Agricultural University, Jorhat, Assam, India, pp. 25.

Bhowmick, B.C. and Ahmed, A.U. 1993. Behaviour of trend and growth of area, production, productivity and supply response of major oilseed crops in Assam. *Agril. Situ. India* 48(1): 3-7.

Bhowmick, B.C. and Goswami, J. 1998. Supply response of some important crops in Assam– An inter-district analysis. *Agril. Situ. India* 55(6): 349-56.

Cauvery, R. 1992. Acreage response to groundnut in north Arcot district, Tamil Nadu. *Econ. Soc. Sci. Rev*. 1(1): 51-60.

Dhindsa, K.S. and Sharma, A. 1997. A regional analysis of growth and supply responses of pulses – A study of Punjab. *Indian J. Agril. Econ*. 52(1):87-100.

Kakaty, G. 2009. Potentialities of Horticultural Crops and Market Accessibilities in Assam and Meghalaya with special reference to Technology Mission for Integrated Development of Horticulture. Agro-Economic Research Centre for North East India, Jorhat, Study No. 130: 109-110.

Madhavan, M.C. 1972. Acreage response of Indian farmers – A case study of Tamil Nadu. *Indian J. Agril. Econ*. 27(1): 67-73.

Naik, D. and Patnaik, S.C. 1984. Impact of price changes an area, output and productivity of potato in Orissa. *Agril. Situ. India* 39(6): 425-429.

Pandey, N.K.; Pandit, A.; Kumar, N.R. and Rana, R.K. 2003. Price Spread Analysis of Potato Marketing at Shimla. *J. Indian Potato Assoc.* 30 (1-2): 99-200.

Saxena, R. and Mathur, P. 2013. Analysis of potato production performance and yield variability in India. *Potato J.* 40(1): 38-44.

Timsina, K.P.; Kafle, K. and Sapkota, S. 2011. Economics of potato (*Solanum tuberosum* L.) production in Taplejung district of Nepal. *Agron. J. Nepal* 2: 173-181.

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