International Journal of Agricultural Sciences
Volume 17 | Issue 1 | January, 2021 | 1-8 ■ ISSN : 0973-130X
DOI:10.15740/HAS/IJAS/17.1/1-8
Visit us : www.researchjournal.co.in

RESEARCH PAPER

Price and non-price decision making factors for groundnut production in Karnataka: An evidence from Nerlove's supply response approach

S.M. Jainuddin*, Seema[1], K. Suhasini[2] **and** T. Lavanya[2]
Department of Agricultural Economics, College of Agriculture (UAS), Kalaburagi (Karnataka) India
(Email: smjainu@gmail.com)

Abstract : The study was conducted with objectives to assess the decision making factors in allocation of area for groundnut production in Karnataka. The secondary data on price and non-price variables were collected from the period 1975-76 to 2015-16. The study concluded that the lagged area, lagged production and lagged yield had exerted significant influence on current year's area, production and yield of the crop across all the period. The study showed that the co-efficient of non-price factors such as rainfall or irrigation was significant which is more important and complementary to price factors for decision making in allocation of land for groundnut production in the state. The study suggested that, attention should be given to expansion of irrigation facility and developing the suitable HYV in groundnut through suitable policy and programmes in the state which may encourage farmers to achieve stable yields and incomes. The government agenises like SAU; Dept of Agriculture, GOK; Extension units, KOF etc., have to arrange for the buyback of groundnut oilseed with processors or oil millers that could benefit the farmers and in turn farmers will expand the area under oilseeds crops in general and groundnut crop in particular in the state.

Key Words : Supply response, Price factors, Non-price factors, Oilseeds, Groundnut

JEL Codes: C32, Q10, Q18, R15

View Point Article : Jainuddin, S.M., Seema, Suhasini, K. and Lavanya, T. (2021). Price and non-price decision making factors for groundnut production in Karnataka: An evidence from Nerlove's supply response approach. *Internat. J. agric. Sci.*, **17** (1) : 1-8, **DOI:10.15740/HAS/IJAS/17.1/1-8.**

Article History : Received : 21.09.2020**; Revised :** 02.11.2020**; Accepted :** 01.12.2020

INTRODUCTION

Even though India is the largest producer of oilseeds in the world, which is unable to meet the domestic demands of vegetable oils. Indian government's was spending millions of rupees on programmes and policies of oilseeds *viz.,* NODP (1985), TMV (1986), OPDP (1991) under TMO, ISOPOM (2004), NMOOP (2014) to meet demand and supply of oilseeds gap and also foster oilseed sectors growth in our country. Yet its performance was not impressive, still depends on imports of oilseeds. So, it is necessary to study of decision making factors of farmers for land allocation in oilseed crops.

*** Author for correspondence :**
[1]College of Agriculture, Professor Jayashankar Telangana State Agricultural University, Hyderabad (Telangana) India
[2]Department of Agricultural Economics, Professor Jayashankar Telangana State Agricultural University, Hyderabad (Telangana) India

The growth in domestic production of edible oils has not been able to keep pace with the growth in consumption and the gap between production and consumption is being met through imports (GOI, 2014). The sustainable production of groundnut is depends on decision of the farmers how they allocate the land for groundnut when compared to the other agricultural crops. Naturally there must be certain determinants which motivated the farmers to make changes in the cropping pattern. Usually, the rational farmers allocate the land or area for the cultivation of crop accounting the natural determinants like price and non price factors.

Karnataka is the sixth largest state in area and production of oilseeds crops in India, whereas second largest in area, production and yield of oilseeds in South India. The total area under oilseed crops in the state was 13.71 lakhs hectare with production is around 11.21 lakh tonnes and yield 833 kg per hectar**e** (GOK, 2016). The among all oilseed crops grown in the state, the groundnut accounted around 42.07 per cent of the Karnataka's total oilseed area and contributed around 71 per cent of Karnataka's total oilseed production during 2012-13 (GOK, 2013).

Hence, based on above background, the present study was undertaken in Karnataka with an overall objective of determining the price and non-price factors in allocation of land for groundnut production in the state. The results of the study would help in suggesting appropriate suitable policy measures and regional level planning to increase the groundnut productivity in particular and oilseeds productivity in general in the state. The results would helps to bridge the demand-supply gap oilseeds production in the state as well as in the country.

MATERIAL AND METHODS

The study was conducted by collecting the 40 years of secondary data on price and non price variables from the period 1975-76 to 2015-16 so as to capture the decision making factors in Karnataka state. Karnataka state has 30 districts at present which were divided into four administrative division's *viz.*, Bangalore, Mysore, Belgaum and Gulbarga. These four divisions of the state were chosen for the present study. The among all oilseed crops grown in the state, the groundnut accounted around 42.07 per cent of the area and 71 per cent of the production during 2012-13 (GOK, 2013). Hence, groundnut was chosen for the present study. The data related to price and non-price decision factors were obtained from various published sources like DES, Bangalore, DAC, district Statistical Office, *Indiastat. com,* etc.

Nerlove's supply response model :

This model provides valuable information regarding farmer's decision behaviour in response to price and non-price factors. The model helps one to know how the farmers react to changes in the price of the crop that they produce (Ramesha *et al*., 1988). The popular theoretical framework used to analyse the determinants of changes in cropping pattern is the Nerlovian Lagged Adjustment Model (Nadda, 1987; Janaia, 1989; Karunakaran and Gangadharan, 2014 and Maiadua *et al*., 2017). Nerlove (1979) used partial adjustment model to estimate the factors influences for land or area allocation for the agricultural crops.

Nerlove's supply response model was chosen for the present study and the farmer's decisions are discussed from three angles, area response, production response and yield response (Janaia, 1989). The following models were developed and estimated price and non price factors.

– Area response model for groundnut

$$logA_t = logC_0 + C_1logP_{t-1} + C_2logP^C_{t-1} + C_3logPR_t + C_4logTRF_t + C_5logA_{t-1} + logV_t$$

– Production response model for groundnut

$$\mathbf{logQ_t = logC_0 + C_1logP_{t-1} + C_2logTRF_t + C_3logI_t + C_4logQ_{t-1} + logV_t}$$

– Production response model for groundnut

$$\mathbf{logY_t = logC_0 + C_1logP_{t-1} + C_2PR_t + C_3logTRF_t + C_4logI_t + C_6logY_{t-1} + logV_t}$$

whereas,

A_t = Area of groundnut in 000' hectares in the current year,

Q_t = Production of groundnut in 000' tonnes in the current year,

Y_t = Yield of groundnut in kg per hectare in the current year,

P_{t-1} = FHP of groundnut and sunflower crop (Rs./qtl) lagged by one year,

P^C_{t-1} = FHP of concerned competing crop (Rs./qtl) lagged by one year,

PR_t = Price risk of groundnut in the current year

TRF_t = Total rainfall in mm (annual average) in the current year

I_t = Irrigated area under groundnut in 000' hectares in the current year

A_{t-1} = Area of groundnut in 000' hectares lagged by

one year,

Q_{t-1} = Production of groundnut in 000' tonnes lagged by one year,

Y_{t-1} = Yield of groundnut in kg per hectare lagged by one year, price and non-price decision making factors included in the model were explained as follows:

Price expectation (P_{t-1}):

The price which farmers take into account for making decision process is called the expected prices. Generally previous year price is regarded as bases for adjustment in the current year. The lagged by one year farm harvest price (FHP) of groundnut taken in account which helps in decision making of area allocation.

Price of the competing crops (P^{C}_{t-1}):

The price of the competing crop is also one of the important variable influencing the decision making process which were selected on the basis of resources requirement, suitability of the soil and agro ecological requirements of the crops (Janaia, 1989).

Price risk (PR_t):

The square deviations of expected values from the actual values were taken as an observation on risk (Ipe and Prabhakarn, 1988 and Janaia, 1989). The expected values are derived from observed values through a three year moving average model.

Irrigated area (I_t):

The availability of irrigation is one of the determinants affecting the quantity of production and per unit area production.

Total rainfall (TRF_t):

The average annual rainfall is a crucial factor determining the area under the crops as well as production and yield of these crops.

Preceding years area under the crop (A_{t-1}):

Traditionally, previous year's area is expected to play an important role in allocating the area under particular crop.

Preceding years production of the crop (Q_{t-1}):

Generally, the farmers will take previous year's production as an indicator for investment decisions for producing a particular crop.

Preceding years yield of the crop (Y_{t-1}):

The resource allocating decision for a particular crop is governed by the yield of that crop in the previous year. So, these all above mentioned variables are included in the model.

Price elasticity and adjustment factor:

The proportionate change in area under the crop (A_t) with respect to proportionate change in any of the variable (independent) which causes the variation is called elasticity of A_t. In this study both short run and long run elasticities were estimated. Estimation of short run and long run price and non-price elasticities were done using following formula:

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

$$\text{Long run elasticity (LRE)} = \frac{\text{Short run elasticity (SRE)}}{\text{Co - efficient of area adjustment}}$$

Speed of adjustment:

Adjustment takes place in relation to actual area planted in preceding year depending on the effect of the price and non-price factors measured by the co-efficient of adjustment. β_2 Co-efficient in the Nerlove adjustment lag model gives the co-efficient of adjustment. It is the co-efficient corresponding to lagged dependent variable. Farmers fully adjust area under the crop in the current year when co-efficient of adjustment is one, whereas if the co-efficient is less than one (<1) then, the adjustment is distributed over time giving rise to lags. The number of years required for ninety five per cent of the effect of the price change to fully materialized is derived (Janaia, 1989 and Gangwar and Singh, 2015) using the following formula:

$$(1-r)^n=0.5$$

where, r = Co-efficient of adjustment (lagged area), n = number of years.

RESULTS AND DISCUSSION

The price and non-price factors of groundnut production were estimated by using Nerlove's model. The price and non-price co-efficients of acreage, production and yield of groundnut were presented in the Tables 1, 2 and 3, respectively.

Area response function of groundnut:

The area response function of groundnut production

Table 1 : Estimated area response functions of groundnut

Divisions/State	Regression co-efficients of							
	Lagged price	Competing crop lagged price	Total rainfall	Price risk	Yield risk	Owned lagged area	R^2	D-W stat.
Whole period (1975-76 to 2015-16)								
Bangalore	0.05 (0.15)	-0.18 (0.14)	0.50** (0.16)	0.03 (0.05)	0.003 (0.06)	0.78* (0.08)	0.79	2.60
Mysore	0.48 (0.34)	-0.74** (0.35)	0.79** (0.28)	-0.11 (0.14)	0.00(0.10)	0.61* (0.14)	0.87	2.17
Belgaum	0.12 (0.22)	-0.13 (0.15)	0.20 (0.25)	-0.07 (0.05)	-0.07 (0.09)	0.94* (0.11)	0.58	2.86
Gulbarga	0.09 (0.06)	-0.10*** (0.05)	0.16** (0.07)	-0.01 (0.02)	0.03 (0.02)	0.91* (0.03)	0.89	2.49
Karnataka	0.10 (0.09)	0.05 (0.19)	0.22 (0.13)	0.03 (0.03)	0.02 (0.05)	0.90* (0.06)	0.80	2.54
Period –I (1975-76 to 1995-96)								
Bangalore	0.06 (0.11)	0.01 (0.20)	0.51** (0.17)	-0.01 (0.04)	0.03 (0.05	0.70* (0.13)	0.97	2.08
Mysore	0.51**(0.16)	-0.30 (0.23)	0.86** (0.22)	-0.13 (0.08)	-0.03 (0.03)	0.36** (0.16)	0.80	2.59
Belgaum	0.11 (0.10)	-0.09 (0.10)	0.11 (0.31)	0.03 (0.06)	-0.01 (0.05)	0.92* (0.19)	0.39	3.02
Gulbarga	0.14 (0.10)	-0.07 (0.09)	0.37** (0.16)	0.05 (0.04)	0.04 (0.05)	0.75* (0.11)	0.73	2.59
Karnataka	0.13 (0.11)	-0.07 (0.24)	0.25 (0.19)	0.05 (0.04)	0.01 (0.06)	0.87* (0.10)	0.88	2.00
Period –II (1995-96 to 2015-16)								
Bangalore	-0.25 (0.49)	-0.12 (0.37)	0.77*** (0.39)	0.11 (0.12)	-0.02 (0.11)	0.76* (0.15)	0.44	2.78
Mysore	1.15 (1.04)	1.21*** (0.67)	3.03* (0.62)	-0.16 (0.29)	0.28 (0.17)	-0.21 (0.27)	0.47	1.91
Belgaum	-0.04 (0.67)	-0.08 (0.44)	0.48 (0.61)	-0.08 (0.12)	-0.08 (0.25)	0.87** (0.23)	0.48	2.81
Gulbarga	0.09 (0.14	-0.12 (0.14)	0.17 (0.12)	-0.01 (0.02)	0.03 (0.03)	0.92* (0.06)	0.88	2.44
Karnataka	-0.06 (0.25)	0.07 (0.48)	0.30 (0.24)	0.06 (0.08)	-0.01 (0.09)	0.90* (0.11)	0.74	2.63

Source: DES, Bangalore, *, ** and *** indicate significance of values at P=0.1, 0.05 and 0.01, respectively

Table 2: Estimated production response functions of groundnut

Divisions/State	Regression co-efficients of					
	Lagged price	Total rainfall	Irrigated area	Owned lagged production	R^2	D-W statistics
Whole period (1975-76 to 2015-16)						
Bangalore	-0.25** (0.11)	1.07* (0.28)	--	0.56* (0.12)	0.43	2.30
Mysore	0.22 (0.32)	0.41 (0.37)	0.47* (0.11)	0.20 (0.14)	0.80	1.74
Belgaum	-0.19 (0.12)	0.70** (0.30)	0.18 (0.16)	0.56* (0.12)	0.40	2.52
Gulbarga	-0.14 (0.09)	0.58** (0.25)	0.17 (0.19)	0.61* (0.14)	0.64	2.15
Karnataka	-0.31 (0.18)	1.05** (0.39)	0.32** (0.14)	0.32*** (0.16)	0.34	2.68
Period –I (1975-76 to 1995-96)						
Bangalore	0.54** (0.16)	1.30* (0.26)	--	0.05 (0.18)	0.86	1.89
Mysore	3.56 (2.41)	0.27 (1.10)	-1.14 (1.60)	-0.29 (0.37)	0.79	2.24
Belgaum	0.18 (0.20)	-1.51 (0.57)	0.29 (0.14)	1.48** (0.32)	0.79	1.09
Gulbarga	-0.08 (0.34)	0.78 (0.29)	0.33 (0.25)	0.33 (0.27)	0.52	2.93
Karnataka	-1.46 (2.71)	10.63 (8.58)	-3.62 (3.28)	-0.43 (0.47)	0.65	2.55
Period –II (1995-96 to 2015-16)						
Bangalore	-1.06** (0.40)	2.42** (0.67)	--	0.30 (0.18)	0.41	2.27
Mysore	0.004 (0.35)	0.62 (0.40)	0.35** (0.13)	0.29*** (0.17)	0.76	1.77
Belgaum	-0.29 (0.21)	0.94** (0.43)	0.07 (0.21)	0.58* (0.13)	0.30	2.35
Gulbarga	-0.09 (0.13)	0.65 (0.38)	0.11 (0.29)	0.60** (0.18)	0.53	2.20
Karnataka	-0.29 (0.20)	0.85** (0.38)	0.27*** (0.14)	0.46** (0.17)	0.36	2.81

Source: Directorate of Economics and Statistics, Bangalore *, ** and *** indicate significance of value at P=0.1, 0.05 and 0.01, respectively

for period I, period II and whole period were presented in the Table 1. The OLS estimation method yielded an co-efficient of multiple determination (R^2) ranged between 0.58 to 0.89 during whole period indicating that about 58 to 89 per cent of the variation in the groundnut area put under cultivation is explained by the independent price and non-price variables are included in the model. The Durbin- Watson statistic approximately ranges between 1.91 to 3.02 across the periods and divisions which indicated that absence of serial correlation between used variables in the model.

The co-efficients of area response model showed that the lagged area, total rainfall, lagged price of competiting crop and lagged price of the crop were found to be significant and most relevant decision variable for area allocation in groundnut in Karnataka state. The regression co-efficients of lagged area were 0.78, 0.61, 0.94, 0.91 and 0.90 for Bangalore, Mysore, Belgaum, Gulbarga divisions and Karnataka state during the whole period (1975-2015), respectively. It indicated that the previous year's area had exerted significant positive influence on current year's area under the crop in all the four regions as well as in Karnataka state level. It observed that the co-efficients of lagged area of groundnut were higher than compared to its own price, total rainfall, price risk, yield risk and competing crop price thereby indicating that lagged area under crop exerts more pressure than price, yield and rainfall on farmers' area allocation decision in the production of groundnut. The result are in line with Tahir (2014) and Gangwar and Singh (2015) who in their study found positive and significant response of lagged area to area allocation for Western UP, Central UP and state as a whole.

The study showed that the total rainfall was found to be positive and significant in Bangalore (0.50), Mysore (0.70) and Gulbarga (0.20) division. This indicated that the farmers' area allocation decision pertaining to groundnut also depended upon the amount of rainfall received during the monsoon season in Bangalore, Mysore and Gulbarga division. The results are supported by the study conducted by Gangwar and Singh (2015) who found positive and significant total rainfall in all the regions of Uttar Pradesh. The price of competing crop exerted significant negative influence on current year area under crop in Mysore (-0.74) and Gulbarga (-0.10) divisions. The results are in line with Gangwar and Singh (2015). The study concluded that non-price factors influenced more on current year's area under the crop than compare to price factor.

Production response function of groundnut:

The production response function of groundnut for period I, period II and whole period are presented in the Table 2. The OLS estimation yielded an R^2 value ranging 0.40 to 0.80 during whole period indicating that about 40 to 80 per cent of the variation in the production of groundnut put under cultivation is explained by the model. The co-efficients of production response of groundnut during the whole period indicated that the previous year's production had exerted significant positive influence on current year's production of crop in all the divisions and Karnataka state except Mysore division. The co-efficients of total rainfall had exerted significant positive influence on current year's production of groundnut in Bangalore, Belgaum, Gulbarga and Karnataka state as a whole except Mysore division. It indicates that for every one per cent increase in rainfall it is likely to increase the production of groundnut by 1.07 per cent, 0.70 per cent, 0.58 per cent and 1.05 per cent in Bangalore, Belgaum, Gulbarga and Karnataka state as whole, respectively.

The production response model showed that the previous year's price had exerted significant negative influence on current year's groundnut production in Bangalore, Belgaum, Gulbarga and Karnataka state as whole except Mysore division. The negative lagged price may be due to the price which is endogenous in nature *i.e.*, the price is determined after supply has been observed which results in low price during bumper production and high prices when supply is low, hence, the negative price elasticity were observed in all divisions except Mysore. The results are similar to Edwin (2009) and McKay *et al.* (1999). The study showed that the previous year's production had exerted significant positive influence on current year's production of groundnut in three divisions and state except Bangalore division.

Yield response function of groundnut:

The yield response function of groundnut for period I, period II and whole period were presented in the Table 3. The OLS estimation yielded R squire value ranging 0.45 to 0.59 during whole period indicating that about 45 to 59 per cent of the variation is explained by the independent variables are included in the model. The DW statistic ranged between 1.59 to 2.67 for Mysore and Karnataka state during whole period indicated the absence of serial correlation. During the whole period (1975-2015), the previous year's yield, total rainfall and

irrigated area crop had significant positive influence on current year's yield of crop in all the divisions and Karnataka state except Mysore division. It indicates that for every one per cent increase in area under irrigated is likely to increase the groundnut yield by 0.90 per cent, 0.27 per cent, 0.46 per cent, 0.29 per cent and 0.18 per cent in Bangalore, Belgaum, Gulbarga, Mysore and Karnataka state as a whole, respectively. The results

Table 3 : Estimated yield response functions of groundnut

Divisions/State	Regression co-efficients of						
	Lagged price	Total rainfall	Irrigated area	Price risk	Owned lagged yield	R^2	D-W stat.
Whole period (1975-76 to 2015-16)							
Bangalore	-0.25** (0.07)	0.90* (0.16)	--	0.08 (0.06)	0.31**(0.13)	0.49	2.06
Mysore	0.48*** (0.25)	0.07 (0.25)	0.29* (0.07)	-0.01 (0.08)	0.09 (0.19)	0.59	1.59
Belgaum	0.03 (0.08)	0.27*** (0.14)	0.02 (0.08)	-0.01 (0.03)	0.67* (0.12)	0.55	2.55
Gulbarga	-0.06 (0.09)	0.46** (0.19)	-0.07 (0.11)	0.05 (0.04)	0.71* (0.15)	0.45	1.97
Karnataka	0.10 (0.14)	0.14 (0.20)	0.18** (0.08)	-0.05 (0.07)	0.44** (0.17)	0.54	2.67
Period I (1975-76 to 1995-96)							
Bangalore	-0.09 (0.10)	0.82** (0.20)	--	0.06 (0.07)	0.26 (0.19)	0.48	2.06
Mysore	1.76 (1.50)	0.91 (0.85)	-0.75 (0.93)	-0.11 (0.23)	-0.48 (0.37)	0.86	2.21
Belgaum	0.14 (0.26)	0.34 (0.41)	0.30 (0.23)	-0.05 (0.08)	0.05 (0.57)	0.94	2.45
Gulbarga	0.06 (0.37)	0.69 (0.25)	0.24 (0.31)	-0.10 (0.12)	-0.08 (0.42)	0.79	3.13
Karnataka	-0.11 (1.13)	1.18 (3.75)	0.22 (1.51)	-0.13 (0.21)	-0.46 (1.13)	0.50	1.81
Period II (1995-96 to 2015-16)							
Bangalore	-0.59***(0.29)	1.24** (0.32)	--	0.19 (0.13)	0.27 (0.18)	0.44	1.97
Mysore	0.48 (0.32)	0.07 (0.28)	0.22** (0.09)	-0.05 (0.12)	0.19 (0.24)	0.50	1.56
Belgaum	0.04 (0.16)	0.30 (0.22)	-0.02 (0.10)	-0.02 (0.04)	0.70* (0.14)	0.52	2.61
Gulbarga	-0.07 (0.13)	0.46*** (0.26)	-0.09 (0.16)	0.06 (0.04)	0.75* (0.18)	0.43	1.95
Karnataka	0.16 (0.20)	0.12 (0.22)	0.17*** (0.10)	-0.07 (0.10)	0.44** (0.20)	0.32	2.71

Note: Figures within the parentheses indicate standard error *, ** and *** indicate significance of values at P=0.1, 0.05 and 0.01, respectively

Table 4 : Estimated short-run and long-run price elasticities for groundnut in Karnataka

Divisions/Period	Area response		Production response		Yield response	
	Short run	Long run	Short run	Long run	Short run	Long run
Whole period (1975-76 to 2015-16)						
Bangalore	0.05	0.23	-0.25**	-0.57	-0.25**	-0.36
Mysore	0.48	1.23	0.22	0.28	0.48***	0.53
Belgaum	0.12	2.00	-0.19	-0.43	0.03	0.09
Gulbarga	0.09	1.00	-0.14	-0.36	-0.06	-0.21
Karnataka	0.10	1.00	-0.31	-0.46	0.10	0.18
Period I (1975-76 to 1995-96)						
Bangalore	0.06	0.20	0.54**	0.57	-0.09	-0.12
Mysore	0.51**	0.80	3.56	2.76	1.76	1.19
Belgaum	0.11	1.38	0.18	-0.38	0.14	0.15
Gulbarga	0.14	0.56	-0.08	-0.12	0.06	0.06
Karnataka	0.13	1.00	-1.46	-1.02	-0.11	-0.08
Period –II (1995-96 to 2015-16)						
Bangalore	-0.25	-1.04	-1.06**	-1.51	-0.59**	-0.81
Mysore	1.15	0.95	0.00	0.01	0.48	0.59
Belgaum	-0.04	-0.31	-0.29	-0.69	0.04	0.13
Gulbarga	0.09	1.13	-0.09	-0.23	-0.07	-0.28
Karnataka	-0.06	-0.60	-0.29	-0.54	0.16	0.29

*, ** and *** indicate significance of values at P=0.1, 0.05 and 0.01, respectively

are similar to Kanwar and Sadoulet (2008) who reported that yield agricultural crops strongly responds to water availability. During same period, lagged price of the crop (-0.25) had exerted significant negative influence on yield of groundnut in Bangalore division. The negative lagged price may be due to the price which is endogenous in nature

During the period I (1975-1994), total rainfall had exerted significant positive influence. During whole period and period II, the current year's irrigated area under crop had exerted significant positive influence on current year's yield of crop in Mysore division and Karnataka.

Short run and long run price elasticities of groundnut:

The short run and long run price elasticities obtained from acreage, production and yield responses of groundnut are presented in Table 4. As expected the long run elasticities are relatively higher than the short run elasticities were significant for groundnut price variable in all the periods in Karnataka. The groundnut short run price elasticity of acreage response for groundnut was 0.51 in Mysore division during period I. It indicates that a one per cent increase in the farm harvest price of groundnut would result in about a 0.51 per cent increase in the area of groundnut cultivated in the Mysore division.

Co-efficient of adjustment:

The co-efficient of adjustment and number of years required to realize 95 per cent price effect of groundnut were presented in Table 5. During the whole period, the area response function result indicated that the groundnut farmers of the state took less number of years (1.30 years) to realize 95 per cent of price effect. The farmers of the Bangalore, Belgaum and Gulbarga division took marginally less number of years that is 1.98, 1.06 and 1.24 years to realize 95 per cent of price effect than compared to Mysore division farmers. Similar observations was observed in others periods except period I, where Mysore division farmers took more number of years (6.71 years) to realize 95 per cent of price effect.

Conclusion and policy suggestions:

The study concluded that, the area response model indicated that lagged dependent variable had significant

Table 5 : Estimated co-efficients and speed of adjustment for groundnut

Divisions	Co-efficient of adjustment (B)			Number of years required to realize 95 % of price effect (N)		
	Area	Production	Yield	Area	Production	Yield
Whole period (1975-76 to 2015-16)						
Bangalore	0.22	0.44	0.69	1.98	3.65	8.07
Mysore	0.39	0.80	0.91	3.18	13.43	31.76
Belgaum	0.06	0.44	0.33	1.06	3.65	2.70
Gulbarga	0.09	0.39	0.29	1.24	3.18	2.42
Karnataka	0.10	0.68	0.56	1.30	7.77	5.17
Period I (1975-76 to 1995-96)						
Bangalore	0.30	0.95	0.74	2.49	58.40	9.95
Mysore	0.64	--	--	6.71	--	--
Belgaum	0.08	-0.48	0.95	1.19	--	58.40
Gulbarga	0.25	0.67	--	2.16	7.48	--
Karnataka	0.13	1.00	--	1.47	--	--
Period –II (1995-96 to 2015-16)						
Bangalore	0.24	0.70	0.73	2.10	8.40	9.52
Mysore	--	0.71	0.81	--	8.75	14.22
Belgaum	0.13	0.42	0.30	1.47	3.45	2.49
Gulbarga	0.08	0.40	0.25	1.19	3.27	2.16
Karnataka	0.10	0.54	0.56	1.30	4.86	5.17

influence on hectrage allocation in both groundnut and sunflower crops in all the four regions of the Karnataka state. The production and yield response model showed that lagged dependent variable (lagged production and lagged yield) and total rainfall had significant influence on hectrage allocation in state. The results indicated that the price inelasticity of supply in both short run as well as long run all the division. The results showed that the highest short run and long run elasticity found for total rainfall in some divisions. It showed that non-price factors are more important and complementary to price for decision making for area allocation in the state. Hence, attention should be given to expansion of irrigation facility through suitable policy and programmes like micro irrigation especially sprinkler and drip irrigation, watershed development, protected irrigation during drought situation etc. which may encourage farmers to achieve stable yields. The research efforts may be concentrated on evolving suitable yield increasing technology like HYV, expansion of area under irrigation and large scale promotion of stabilization measures like crop insurance which can enhance the per unit production as well as stabilize the area and yield of groundnut. The government agenises like SAU; Dept of Agriculture, GOK; Extension units, KOF etc., have to arrange for the buyback of oilseeds with processors that could benefit the farmers and in turn farmers will expand the area under oilseeds crops in general and groundnut crop in particular. It will help for the growth and development of oilseed sector in the state as well as in the country.

Acknowledgement:

I express my special gratitude to UGC, New Delhi for their financial support through UGC-MANF FELLOWSHIP during the Ph.D study in PJTSAU, Hyderabad.

REFERENCES

Edwin, Muchapondwa (2009). Supply response of Zimbabwean agriculture: 1970-1999. *African J. Agric. & Resource Econ*., **3** (1) : 28 - 42.

Gangwar, A. and Singh, V. (2015). An analysis of supply response of rapeseed-mustard in different regions of Uttar Pradesh. *J. Oilseed Brassica*, **6** (1) : 158-166.

Government of India (2014). Status paper on oilseeds, Department of Agriculture and Co-operation. Ministry of Agriculture and Farmers Welfare. pp. 1-2.

Government of Karnataka (2013). Estimates of principal crops in Karnataka for the year 2012-2013. *Annual Report 2012-13.* Directorate of Economics and Statistics. Bangalore, Karnataka (India).

Government of Karnataka (2016). *Karnataka at a glance 2015-16*. Directorate of Economics and Statistics. Bangalore. pp. 37-48.

Ipe, Viju and Prabhakaran, T. (1988). Price response of a perennial crops: a case of Indian natural rubber. *Indian J. Agric. Econ*., **43** : 624-630.

Janaia, A. (1989). Growth and supply response of major commercial crops in Andhra Pradesh: An econometric analysis. M.Sc. (Ag.) Thesis, Andhra Pradesh Agricultural University. Hyderabad (India).

Kanwar, S. and Sadoulet, E. (2008). Dynamic output response revisited: the Indian cash crops. *Developing Economies*, **46** (3) : 217–241.

Karunakaran, N. and Gangadharan, K. (2014). Supply response of coconut cultivation in Kerala, *Economic Affairs,* **59** (4) : 681 - 686.

Maiadua, S.U., Suhasini, K. and Seema (2017). Sorghum output supply response to price and non price factors in Nigeria. *Indian J. Econ. & Develop*., **13**(3) : 434-441.

Mckay, A., Morrisey, O. and Vaillant, C. (1999). Aggregate supply response in Tanzanian agriculture. *J. Internat. Trade Econ. & Develop*., **8** : 107-123.

Nadda, A.L. (1987). Supply response of perennial crops – a study of Himalayan Apple. *Indian J. Agricultural Econ*., **42** : 446 - 455.

Nerlove, M. (1979). The dynamics of supply:retrospect and prospects. *American J. Agric. Econ*., **61**(5):874 - 888.

Ramesha, Y.S., Ramanna, R. and Lalith, Achoth (1988). Supply response of rice in Karnataka, *Agric. Situ. India,* **43** (4): 9-13.

Tahir, Hussaini Mairiga (2014). Hectrage response of some selected cereal crops to price and non-price factors in Nigeria (1983-2008). *Research on Humanities & Social Sciences,* **4** (11) : 44-53.