PESTICIDES AND ITS IMPACT ON INDIAN AGRICULTURE PRODUCTION

Rohtash[1] Pardeep[2]

ABSTRACT: This paper analysis the impact of pesticides on the production of agriculture sector. The study utilised the secondary data related to the usage of the pesticides by Indian farmers for agriculture and the total production of the agriculture sector. Data has been taken from the official reports of the Ministry of Agriculture. It is found from the study that pesticides do not ensure any increase in the agriculture production.

INTRODUCTION:

Recently, there is a challenge in the terms of crops loss due to its infections with pests and insects which was more prominent in cases where the crop rotation was not done [1]. Hence in order to ensure that crops are not damaged farmers resorted to the use of chemical pesticides which effectively controlled the pets and Insects infection. Apart from this hybrid seeds were developed which were more immune to pest damage while giving higher agriculture produce per hectare. All this combined with latest agriculture and harvesting techniques led to enhanced productivity from the farm lands [2]. The continuous use of pesticides though reduces the crop damage but at the same time kill those microorganisms which are so essential to rejuvenate the soil quality. Also their application on the crops leads to these harmful chemicals reaching the water bodies thereby polluting them creating a human hazard for the human population. Also excessive use of same results in these harmful chemicals reaching the human body when they consume these produces. Not only that it has been observed that while the use of pesticides reduces crop damage but at the same time they also kill the other useful insects which act as a natural resistance to crop damaging pests. Moreover, the crop damaging pests slowly develop immunity to these pesticides which forces farmers to use more of pesticides which is an additional investment for them [3]. In the same way the chemical fertilizers quantity has to be increased since the natural rejuvenation of soil stops happening in absence of bio diversity of microorganisms which are natural source of nitrogen, phosphorous and potassium which are critical minerals promoting plant growth [4]. Overall it has been observed that while the use of pesticides gave immediate benefit in terms of enhanced productivity thereby providing global food security but at the same time their long term use has led to not only various changes in the soil properties including drastic reduction in microbial population but also have become a threat to environment and the humans themselves [5]. An

[1] Research Scholar, HSB. GJUS&T, Hisar.
[2] Research Scholar, HSB. GJUS&T, Hisar.

important element which plays a key role in the crop production is known as pesticide. Pesticide helps in increasing the crop production and also helps in protection of the agriculture crops in the country.

The use of pesticides has also threatened the sustainability of the agriculture output in the long term thereby having a negative impact on food security as well. Hence in order to have a sustained agriculture production it becomes imperative to study the effect of these chemicals in details on the quality and fertility of soil. Steps need to be taken to limit their use and shift to organic fertilizers and manures which are not only cost effective but also environmental friendly [6].

OBJECTIVES:

The objective of this paper is to find out the impact of pesticides on the production of agriculture sector.

VARIABLE AND DATA:

Current research is based on the secondary data related to the usage of the pesticides by Indian farmers for agriculture production. Data has been taken from the official reports of the Ministry of Agriculture. Variables have been used in the current paper which has been explained as:

Independent Variables: In present study, consumption of pesticides has been taken as the independent variables in the regression model where the impact of pesticides on the production of agriculture sector has been measured.

Dependent variables: Total production of agriculture for food grains have been taken as the dependent variable in the regression model.

In this study regression model has been used to measure the cause and effect relation between usages of pesticides on the production of agriculture sector. Time series data has been taken for analysis purpose and showed in tabular form. Null hypothesis tested through regression model are given below:

Null Hypothesis: Increased use of pesticides does not have a significant impact on the agriculture production.

RESULTS AND DISCUSSIONS:

Table 1 shows the agriculture production of India for the year 2001 to 2016 comprising variables namely; agriculture production, yield per hectare, net irrigated area, consumption of fertilizers and consumption of pesticides.

Table 1: Agriculture Production and Pesticides

Year	Agriculture Production (Million Tonnes)	Consumption of Pesticides (Thousand tonnes)
2015-16	275.68	50.41
2014-15	251.57	56.12
2013-14	252.02	60.28
2012-13	265.04	45.62
2011-12	257.13	52.98
2010-11	259.29	55.54
2009-10	244.49	41.82
2008-09	218.11	43.86
2007-08	234.47	44.77
2006-07	230.78	41.51
2005-06	217.28	39.77
2004-05	208.60	40.67
2003-04	198.36	41.00
2002-03	213.19	48.30
2001-02	174.78	47.02
2000-01	212.85	43.58

Interpretation: It can be interpreted from the table 1 that there is an increase in the agriculture production from 212.85 million tonnes to 275.68 million tonnes. Hence, there is an increase in the agriculture production during last fifteen years, but if we look at the trend of the data then it shows a mix trend in some years it is increasing and for other years it keeps on decreasing, there is a not a constant increase or decrease in the agriculture production. Consumption of pesticides is increased from 43.58 thousand tonnes to 50.41 thousand tonnes.

Null Hypothesis: use of pesticides does not have a significant impact on the agriculture production.

Table 2: Regression

	R Value	R Square Value	Adjusted R Square Value	Std. Error
1	.870[a]	.757	.720	14.59865

a. Predictors: Consumption of Pesticides, Consumption of Fertilizer

Interpretation: Table 2 shows the regression model for the agriculture production and consumption of pesticides in India. It is found that the value of R was found to be .870, which indicates the high degree of

positive correlation between agriculture production and consumption of pesticides. Further, the value of R-square is found to be 0.757, which indicates that the consumption of fertilizers and consumption of pesticides causes 75 per cent variation in the value of agriculture production, which is a significant percentage.

Table 3: One-Way Anova

Model		Sum of Squares	Degree of Freedom	Mean Square Value	F-value	p-value
1	Regression	8635.971	2	4317.985	20.261	.000[b]
	Residual	2770.568	13	213.121		
	Total	11406.539	15			

a. Dependent Variable: AGRICULTURAL PRODUCTION – FOODGRAINS

b. Predictors: Consumption of Pesticides, Consumption of Fertilizer

Interpretation: The results of ANOVA signify that dependent variable i.e. agriculture production and independent variables consumption of pesticides are associated to each other.

Table 4: Regression Coefficients

Model		Unstandardized Coefficients value		Standardized Coefficients value	t-value	p-value
		B-value	Std. Error value	Beta value		
1	(Constant)	90.102	29.064		3.100	.008
	Consumption of Pesticides	.588	.696	.134	.845	.414

a. Dependent Variable: AGRICULTURAL PRODUCTION – FOODGRAINS

Interpretation: the value of regression coefficient for the variable consumption of pesticides is found to be 0.134, at a t-value of 0.845, and p-value of 0.414, which indicates that the consumption of pesticides has a positive but insignificant impact on the agriculture production. Hence, with the increased use of pesticides there may or may not be increase in the agriculture production. The study and null hypothesis which states that Increased use of pesticides do not have a significant impact on the agriculture production, gets accepted in the study.

Table 5: Regression

	R Value	R Square Value	Adjusted R Square Value	Std. Error
1	.911[a]	.830	.804	85.57111

a. Predictors: Consumption of Pesticides

CONCLUSION:

It can be concluded from the study that pesticides do not ensure any increase in the agriculture production. The reason behind this is various other factors which have a significant impact on the agriculture production such as; nature, weather, rain, harvesting techniques, and the debt burden of the farmers.

LIMITATIONS:

The study is limited to the use of pesticides only, while there are various other parameters which influence the agriculture production in the country such as; rain quantity, quality of fertilizers, agriculture techniques, subsidies from government, support from government and many more. The study has not discussed the non-food grains production in the study, which is also important and contributes significantly to the agriculture sector.

REFERENCES:

[2] Bi YL, Li XL, Christie P. 2003. Influence of early stages of carbuncular mycorrhiza on uptake of zinc and phosphorus by red clover from a low phosphorus soil amended with zinc and phosphorus. Chemosphere. 50:831–837. doi:10.1016/S0045-6535(02)00227-8

[1] Carvalho FP. 2006. Agriculture, pesticides, food security and food safety.

[3] Harrier LA, Watson CA. 2004. The potential role of carbuncular mycorrhiza (AM) fungi in the bio protection of plants against soil-borne pathogens in organic and/or other sustainable farming systems. Pest Management Science 60:149–157. doi:10.1002/ps.820.

[4] Hu J, Lin X, Wang J, Dai J, Cui X, Chen R, Zhang J. 2009. Carbuncular mycorrhiza fungus enhances crop yield and P-uptake of maize (Zeamays L.): A field case study on a sandy loam soil as affected by long-term P-deficiency fertilization. Soil Biology & Biochemistry. 41: 2460–2465.

[5] Jansa J, Wienken A, Frossard E. 2006. The effects of agricultural practices on carbuncular mycorrhiza fungi. In 'Functions of soils for human societies and environment'. (Eds E Frossard, WEH Blum, BP Warkentin) pp. 89–113. (Geological Society: London)

[6] Miller GT. 2004. Sustaining the Earth, 6th edition. Thompson Learning, Inc. Pacific California. Chapter 9, Pages 211-216