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# ECONOMIC ANALYSIS OF SUSTAINABLE FARMING METHOD IN SIRMAUR DISTRICT OF HIMACHAL PRADESH, INDIA

**Rohit Kumar Vashishat*; Subhash Sharma**, Chinglembi Laishram***, Riya Thakur****, Ghanshyam*****, Priyank Sharma******; Rajeshwar Singh Chandel*******

*Associate Professor,
Department of Social Sciences,
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: dsubhashsharma@gmail.com

**Research Scholar,
Department of Social Sciences,
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: chinglaish@gmail.com

*** Research Scholar,
Department of Social Sciences,
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: prohitvashishat@gmail.com

**** Research Scholar,
Department of Social Sciences,
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: 2octkaranriya@gmail.com

***** Research Scholar,
Department of Social Sciences
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: ghanshyamgt8387@gmail.com

****** Research Scholar,
Department of Social Sciences,
UHF, Nauni, Solan, Himachal Pradesh, INDIA
Email Id: sharmapriyank877@gmail.com

*******Vice Chancellor,
UHF Nauni, Solan Himachal Pradesh, INDIA

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## ABSTRACT

*Himachal Pradesh is a mountainous province of India situated in the Himalaya region, Himalayan region has rich biodiversity and is an economically important region of India. Most of the population in this region lives in rural areas and livelihood mainly depend upon agriculture, whereas most of the farmers are small and marginal, such as 89 per cent population of Himachal Pradesh lives in rural area and 87 per cent of farmers are marginal and small also 65 per cent of the workforce of the total population are involved in agricultural allied sectors. For the development of agriculture and rural economy an initiative has been taken to promote sustainable agricultural practices in Himachal Pradesh by promotion for natural farming. The current study was conducted in Sirmaur district of Himachal Pradesh, with a sample of 60 farmers using simple*

*random sampling. The study mainly focused on the NF cropping system, which claims to contribute to sustainable agriculture (Agro ecology) in many ways i.e., climate resilient farming, livestock friendly, soil health, healthy nutritious food, chemical free farming and sustainable farming. NF is also reported as the most cost-effective farming and also known as "Zero Budget Natural Farming." NF focuses mainly on lowering agricultural costs, improving food quality, chemical-free food, soil fertility and food & nutritional security. As a result, it is essential to determine the economic evaluation of crop production in terms of Natural Farming and Chemical Farming techniques in order to enable farmers to embrace sustainable farming. Therefore, the comparative economics of Natural Farming and Chemical Farming (Conventional Farming) and resource use efficiency were analysed. From the sample study, it has been found that the major crops grown under NF crop combination were Cereals-Pulses-Vegetables (Kharif 14% and Rabi 157%), Cereals-Vegetables (Kharif 25% and Rabi 14%), Vegetables (107%), Sugarcane-Vegetables-Turmeric (92%) and Cereals-Vegetables-Oil (124%) had high Crop Equivalent Yield (CEY) as compared to CF crops also NF Farmers received high returns per hectare. NF farmers were using resources very efficiently, which indicates that there is still a possibility of a rise in income from the adoption of natural farming through the use of own capital and a stronger marketing method. It can be concluded that cultivation by natural farming methods has been found to be productive.*

**KEYWORDS**: *Natural Farming, Sustainable Agriculture, Agroecology, Chemical Free, Nutritional Security, Zero Budget Natural Farming, Climate Resilient Farming.*

## 1. INTRODUCTION

Agriculture contributes 18 percent of Gross Domestic Product and provides jobs to 50 percent of the country's workforce (Anonymous, 2019a). The most widely adopted farming system globally is a Chemical farming system, as it often produces 98 per cent of the world 's food (Tal, 2018). Like many other states, Agriculture is also a primary source of income for the people of Himachal Pradesh and plays a major role in the state economy. About 12.73 percent of the total State Income (GSDP) comes from agriculture and its allied sectors. Agriculture and horticulture employ nearly 69 percent of the state workforce (Economic survey, Himachal Pradesh, 2020). To feed the large population there is a huge amount of food production required. The 7 billion global population is projected to grow by 70 million per annum, increasing by 30 percent to 9.2 billion by 2050 (Józsefet al, 2012). In the process of increasing crop production, herbicides, insecticides, fungicides, nematicides, fertilisers and soil amendments are now being used in higher quantities than in the past (Gill and Garg, 2014). Use of chemicals in Agriculture has several hazardous effects, such as contamination of food, soil, surface water, ground water, air, turf and other vegetation. Agricultural chemicals are mostly toxic in nature and these are harmful to the health of birds, fishes, microorganisms, animals, trees, plants and humans. The widespread use of chemicals leads to the pest genetic mutation, hence resistant to pesticides (Shetty, 2009). Use of chemicals in agriculture to maximize production is vicious to food nutritional value, high cost of production and decreasing prices of agricultural produce, which leads to "suicide crisis". Thousands of farmers have committed suicide. (Mishra, 2008). Cancer is widely spread in Punjab due to over usage of pesticides in agricultural practices (Kumar and Kaur, 2014). Furthermore, it has also been noticed that conventional agriculture can't be sustainable in the long term. (Chand et al., 2011).

There is a need for an alternative method of agriculture that can operate in a friendly eco-system while maintaining and increasing crop productivity is now being realised. The farming system needs sustainability in order to improve the factors of production and human health or the farming

system, which has no hazardous effects on the earth environment and human health (Padmavathy and Poyyamoli, 2011). Sustainable agriculture or Agroecology is a need of the hour to overcome the constraints discussed above. According to the definition of Agroecology, it is the integrative study of the ecology of the entire food system encompassing ecological, economic and social dimensions (Francis et. al, 2003). There is a sustainable farming method supporting agroecology concept called Natural Farming. It is also known as Zero budget Natural Farming (ZBNF) or Subhash Palekar Natural Farming (SPNF) in Himachal Pradesh. It is a best-known alternative to chemical farming (Munster, 2016). It is an extreme version, which does not shy away from suggesting that without any need of any external inputs all inputs must be locally organized from and around the village. Palekar claims that both the dung and urine of native livestock (Bosindicus) should be used to make Jivamrit as it has a superior micro culture especially in comparison to that of European breeds (Palekar, 2005). NF relies primarily on use of materials such as Jivamrit, Bijamrit and Acchadana (natural mulch) to encourage microbial development, seed health and soil fertility. Although ZBNF appears to be hitting the right notes when it comes to environmental protection (Khadse et al, 2017). Agriculture sectors require modification in social, economic and environmental ways. Although it is a very huge sector of the world economy.

Natural Farming is an answer to solve the agrarian crisis and the growing epidemic of farmers' suicides in India (Babu, 2008). The aim of Natural Farming is to reduce the cost of production to almost zero and to come back to the "pre-green revolution" style of agriculture (Khadse et al, 2019). This would seem to lead growers out of loans by putting a stop to agricultural chemicals practices. The central government has implemented a policy to encourage farming methods throughout India. The state governments of Andhra Pradesh, Chhattisgarh, Himachal Pradesh, Uttarakhand, Kerala and Karnataka asked Padma Shri Subhash Palekar to educate their farmers for Natural Farming (Anonymous, 2016).

In order to promote ZBNF in Himachal Pradesh, a scheme 'PrakritikKheti-Khushhal Kisan' was initiated with a budget allocation of Rs. 35 Crore (2019-20). Under this scheme, peasants will be supported with training, the machinery required to achieve the objective of sustainable farming, doubling farmers' incomes, improved soil fertility and low input costs. Himachal Pradesh has changed the name of ZBNF to Subhash Palekar Natural Farming (SPNF) (Anonymous, 2019b). A few years ago, SPNF was adopted in Himachal Pradesh. As a result, there is no true data on Natural Farming. To find out whether Natural Farming (NF) supports the economic factor of Agroecology or not, this economic study has been conducted to find out the economic reliability of Natural Farming. In view of these factors, the proposed study entitled "Comparative Economic Analysis of Natural Farming vis-à-vis Conventional Farming in Sirmaur District of Himachal Pradesh" is carried out.

## 2. MATERIALS AND METHODS

This chapter outlines the characteristics of the study area, the methods adopted in selection of the sample, the nature and sources of data and the various statistical tools and techniques employed in analysing the data and have been described under the following sub-heads.

- Sampling procedure
- Nature and sources of data
- Analytical techniques

### SAMPLING PROCEDURE

### Selection of the Study Area

Sirmaur district of Himachal Pradesh was purposively selected for the present study. Sirmaur

district is the southernmost district of Himachal Pradesh it is largely mountainous and rural. Total area of Sirmaur district is 2,825 Sq.km. with a population of 5,29,855. The district comprises six development blocks Rajgarh, Pachhad, Nahan, Renuka, Shillai and Paonta.

**Sampling design and sample size**

Simple random sampling design was adopted to select the ultimate sample of the farmers practicing Natural Farming respondents. A list of farmers practicing Subhash Palekar Natural Farming was procured from the Project Director ATMA, Nahan (Simaur). 15 farmers each from four blocks Rajgarh, Paonta sahib, Pachhad and Nahan were selected randomly. Thus, a sample of 60 farmers were selected for the study.

**Distribution of sampled farmers practicing Natural Farming according to their size of land holding**

For the analysis of data, the total respondents were divided according to the size of their land holdings into three classes, viz., marginal (<1 ha), small (1-2 ha), and medium (2-4 ha). The distribution of the sampled farmers is present in Table 1.

**TABLE 1: DISTRIBUTION OF SAMPLED HOUSEHOLDS ACCORDING TO THEIR LAND HOLDINGS**

| Sr. No. | Category of farmer | No. of farmers | Average land holding (ha) |
|---|---|---|---|
| **1.** | Marginal (< 1 ha) | 41 (68.33) | 0.51 |
| **2.** | Small (1 – 2 ha) | 11 (18.33) | 1.09 |
| **3.** | Medium (2 – 4 ha) | 8 (13.34) | 2.02 |
| **4.** | **Total** | **60 (100)** | **1.20** |

**NATURE AND SOURCES OF DATA**

To meet the objectives of the present study, both primary as well as secondary data were collected**.**

**Primary Data**

Primary data were collected from the farmers practicing Natural Farming by survey method using a well-structured and pretested schedule

**Secondary Data**

Secondary data were collected in terms of numbers of registered farmers practicing Natural Farming from the Project Director, ATMA, Nahan (Sirmaur).

**3. ANALYTICAL FRAMEWORK**

To full fill the specific objectives of the study, based on the nature and extent of availability of data, the following analytical tools and techniques have been employed for the analysis of the data.

**Costs and Returns Analysis**

**CACP Cost Concepts**

- Cost $A_1$ includes
- i)Cost of planting material cost
- ii)Cost of manures, fertilizers and plant protections
- iii)Cost of hired human labor
- iv)Cost of owned and hired machinery
- v)Irrigation charges
- vi)Depreciation on implements, farm buildings and irrigation structures
- vii)Land revenue
- viii)Interest on owned working capital
- ix)Other miscellaneous charges
- Cost $A_2$: Cost $A_1$ + rent paid for leased in land
- Cost $B_1$: Cost $A_{1+}$ interest on the fixed capital assets excluding land
- Cost $B_2$: Cost $B_1$ + rental value of owned land
- Cost $C_1$: Cost $B_1$ + imputed value of family labour
- Cost $C_2$: Cost $B_2$ + imputed value of family labour
- Cost $C_3$: Cost $C_2$ + 10 per cent of cost $C_2$ on account of managerial function performed by the farmer

**Crop Equivalent Yield (CEY)**

In the Natural Farming system, many types of crops were cultivated in a multiple or mixed cropping. It was difficult to compare the economics of multiple crops with a single crop. According to Francis (1986) crop equivalent yield (CEY) is the sum of Equivalent price and intercrop yields. The differing yield intercrops were transformed into the equivalent yield of any crop depending on the commodity price. So, a comparison was made based on economic returns and crop equivalent yields (CEY) of multiple cropping sequences was calculated by converting the yield of different intercrops/crops into equivalent yield of any one crop based on price of the produce Mathematically CEY represented as:

$$CEY = C_Y + C_{Y1}\frac{P_1}{P_0} + C_{Y2}\frac{P_2}{P_0} \ldots.$$

Where,

- $C_Y$ = Yields of the main crop
- $P_0$ = Price of the main crop
- ($C_{y1,}$ $C_{y2,}$ $C_{y3\ldots..}C_{yn}$) = Yields of inter crop, which are to be converted to equivalent of main crop yield
- ($P_1$, $P_2$, $P_3$…. $P_n$) = Price of the respective intercrops.

**Statistical analysis**

**Relative Economic Efficiency (REE)**

$$REE = \frac{\text{Net Returns in NF} - \text{Net Returns in CF}}{\text{Net Returns in CF}} \times 100$$

## 4. RESULTS AND DISCUSSION

### Cropping Pattern under Natural Farming and Conventional Farming Systems

Any region's crop pattern mainly depends on climate, soil condition, micro-climate, resources available in that area and management factors. The change in the percentage of land in the net shown area under different crops shows the degree of diversification of agriculture. This represents each crop's potential reach along with the preliminary requirement of the inputs for various crops. A close analysis of the cropping pattern also indicates the agricultural status in the region. On the farm, the proportion of a particular crop in gross cropped area underlines the importance the farmer attaches to a particular crop. The cropping pattern of the both natural and Conventional Farming system is presented in Table 2 and Table 4.

### Cropping Pattern under Natural Farming Systems

The crop combination adopted by farmers was the combination of crops having complementary behaviour between the crops. Cropping pattern under Natural Farming is presented in Table 2. In the Kharif season the major crop combination adopted by the farmers was cereals-vegetable (55%) followed by cereals–vegetables-pulses (45%), vegetables (38.33%) and Sugarcane-vegetables-turmeric (16.66%). In Rabi season, the major crop combination grown by farmers was cereals-vegetable (53.33%) followed by cereals-vegetables-oil (50%) and cereals–vegetables-pulses (31.66%). From the net shown area the proportional area in Kharif season under different crop combination was highest in cereals-vegetable 0.13 ha (33.33%) followed by cereals–vegetables-pulses 0.10 ha (25.64%), vegetables 0.10 ha (25.64%) and sugarcane-vegetables-turmeric 0.06 ha (15.38%). In Rabi season area under different crop combinations in cereals-vegetable was 0.15 ha (40.54%) followed by cereals-vegetables-oil seed crops 0.14 ha (37.84%) and cereals–vegetables-pulses 0.08 ha (21.62%). It was noticed that cropping intensity of sampled households was 192.06 per cent; it shows that farmers are utilizing 192 percent of land during one agriculture year for the cultivation of crops.

**TABLE 2: CROPPING PATTERN OF THE SAMPLE HOUSEHOLDS IN NATURAL FARMING**

| Farming system | Kharif Area (Ha) | No. of farmers | Rabi Area (Ha) | No. of farmers |
|---|---|---|---|---|
| Cereals - vegetables -pulses | 0.10 (25.64) | 27.00 (45.00) | 0.08 (21.62) | 19.00 (31.66) |
| Cereals - vegetables | 0.13 (33.33) | 33.00 (55.00) | 0.15 (40.54) | 32.00 (53.33) |
| Vegetables | 0.10 (25.64) | 23.00 (38.33) | - - | - |

| | | | | |
|---|---|---|---|---|
| Sugarcane - vegetable - turmeric | 0.06<br>(15.38) | 10.00<br>(16.66) | -<br>- | - |
| Cereals -vegetables - oil seed crops | -<br>- | - | 0.14<br>(37.84) | 30.00<br>(50.00) |
| Net sown area | 0.39<br>(100) | 60 | 0.37<br>(100) | 60 |
| **Net sown area (ha)** | **0.39** | | | |
| **Gross cropped area (ha)** | **0.76** | | | |
| **Cropping intensity (%)** | **192.06** | | | |

Figures in parentheses are percentages to the total

**Major crop combinations under Natural Farming**

Farmers practising Natural Farming were growing crops in intercropping manner Shown in Table 3. The combinations of these crops were grown according to one crop's interaction behaviour with another crop. Palekar suggests the combination of crops where one legume crop is necessary to grow in an intercropping system because legumes nodules produce nitrogen. The nodules receive nitrogen from the atmosphere and store it in the soil, so that it can also be used by other plants which need nitrogen (Khadse and Rosset, 2019). All adopted crop combinations cultivated by Natural Farming growers are then categorised into various crop combination is presented in Table 3.

**TABLE 3. SEASON-WISE MAJOR CROP COMBINATIONS IN NATURAL FARMING SYSTEMS OF SAMPLED HOUSEHOLD**

| **Major Crops Combination** | **Kharif** | **Rabi** |
|---|---|---|
| **Cereals -Pulse - Vegetables** | Maize + Kidney Bean +French Bean or Ginger or Tomato<br>Maize + Black Gram+ Tomato or French bean or Capsicum<br>Maize +Kidney Bean + Cucumber or Capsicum<br>Maize + Black Gram +Turmeric<br>Maize + Cucumber + Turmeric + Black Gram<br>Maize +Kidney Bean +Coriander<br>Maize +Black Gram or Bean + Cucumber or Cauliflower<br>Maize +Kidney Bean + Chili or turmeric or ginger | Wheat + Black Gram + Cabbage<br>Wheat + Black Gram+ Cauliflower<br>Wheat + Soybean +Cauliflower<br>Wheat + Horse Gram + Garlic<br>Wheat + Chickpea + Garlic<br>Wheat +Pea + Chickpea |

| | | |
|---|---|---|
| **Cereals-Vegetables** | Maize +Tomato French Bean<br>Maize+ Tomato French Bean +Capsicum<br>Maize +French Bean<br>Maize + Ginger + Coriander French Bean<br>Maize + Tomato +Capsicum + French Bean | Wheat + Cauliflower<br>Wheat + Pea + Cauliflower<br>Wheat + Cauliflower or Cabbage |
| **Vegetable** | Tomato+Capsicum+ Ginger + French Bean<br>Tomato + French Bean +Cauliflower<br>Tomato +French Bean +Capsicum<br>Tomato +Chili or Capsicum + French Bean or Cucumber | Pea + Cauliflower +Coriander<br>Pea +Cabbage +Coriander or garlic<br>Pea + Cabbage + Fenugreek<br>Pea + Cauliflower or Cabbage |
| **Sugarcane-Vegetables – Turmeric** | - | - |
| **Cereal-Vegetables -Oil seed crop** | Sugarcane +French Bean + Turmeric | Wheat + Pea + Mustard + Linseed<br>Wheat + Cauliflower +Mustard<br>Wheat + Pea + Mustard |

**Cropping Pattern Conventional Farming**

In the Conventional Farming system, farmers grow various crops as a sole crop. The major crops grown by sampled farmers were Maize, Tomato, French Bean and Sugarcane in the Kharif season. Wheat, Pea and Mustard were the major crops grown in Rabi season. The cropping pattern of Conventional Farming is presented in Table 4. In Kharif season area under Maize, Tomato, French Bean and Sugarcane in Conventional Farming crops were 0.06 ha (21.43%), 0.10 ha (35.71%), 0.03 ha (10.71%) and 0.05 ha (17.86%), respectively. The major crops grown in Rabi season by farmers were Wheat 0.12 ha (52.17%) followed by Pea 0.06 ha (26.09%) and Mustard 0.02 ha (8.70%). Thus, the cropping intensity in Conventional Farming was found to be 184.68 percent. The NF system has higher cropping intensity shows that farmers were utilising their land efficiently under NF system.

**TABLE 4. CROPPING PATTERN OF THE SAMPLE HOUSEHOLDS IN CONVENTIONAL FARMING**

| **Kharif crops** | **Area (area)** | **Rabi crops** | **Area (ha)** |
|---|---|---|---|
| Maize | 0.06 (21.43) | Wheat | 0.12 (52.17) |
| Tomato | 0.10 (35.71) | Pea | 0.06 (26.09) |
| French Bean | 0.03 (10.71) | Mustard | 0.02 (8.70) |
| Sugarcane | 0.05 (17.86) | Other crops | 0.03 (13.04) |
| Other crops | 0.04 (14.29) | | |
| Total Kharif area | 0.28 (100) | Total Rabi area | 0.23 (100) |
| **Net sown area (ha)** | **0.28** | | |
| **Gross cropped area (ha)** | **0.51** | | |
| **Cropping intensity (%)** | **184.68** | | |

Figures in parentheses are percentages to the total

**TABLE 5. YIELD COMPARISON BETWEEN NATURAL FARMING AND CONVENTIONAL FARMING SYSTEMS**

| **Natural Farming** | | **Conventional Farming** | | **Yield difference (Qtl/ha)** | **Percent change in yield of NF over CF(%)** |
|---|---|---|---|---|---|
| **Crops** | **Crop equivalent Yield Qtl/ha** | **Crops** | **Yield Qtl/ha** | | |
| Cereals-Vegetables-Pulses(1) | 74.32 | Maize | 65.04 | 9.27 | 14.25 |
| Cereals-Vegetables(2) | 78.65 | French Bean | 62.85 | 15.80 | 25.14 |
| Vegetable (3) | 142.63 | Tomato | 85.77 | 56.85 | 66.28 |
| Sugarcane-Vegetables-Turmeric (4) | 1308.19 | Sugarcane | 808.54 | 499.65 | 61.80 |

| | | | | | |
|---|---|---|---|---|---|
| Cereals-Vegetables-Pulses(5) | 65.99 | Wheat | 25.61 | 40.38 | 157.69 |
| Cereals-Vegetables(6) | 66.76 | Pea | 60.27 | 6.49 | 10.78 |
| Cereal, vegetable & oil seed crop (7) | 40.51 | Mustard | 21.83 | 18.69 | 85.63 |

**TABLE 6. COST COMPARISON OF NATURAL FARMING SYSTEM AND CONVENTIONAL FARMING SYSTEM**

| **Natural Farming** **Crops** | **Cost of production (Rs./Qtl)** | **Cost of cultivation (Rs./ha)** | **Material costs (Rs./ha)** | **Labour costs (Rs./ha)** |
|---|---|---|---|---|
| Cereals-Vegetables-Pulses (1) | 778 | 53812 | 23614 | 11581 |
| Cereals-Vegetables (2) | 1134 | 79275 | 46653 | 11250 |
| Vegetable (3) | 748 | 104460 | 62740 | 12685 |
| Sugarcane-Vegetables-Turmeric (4) | 49 | 59691 | 29949 | 11525 |
| Cereals-Vegetables-Pulses (5) | 871 | 52174 | 19455 | 11417 |
| Cereals-Vegetables (6) | 749 | 52501 | 17159 | 11049 |
| Cereal, vegetable & oil seed crop (7) | 1154 | 45147 | 12220 | 11513 |
| **Conventional Farming** | | | | |
| Maize | 952 | 61803 | 14249 | 10021 |
| Tomato | 972 | 58116 | 17178 | 16701 |
| French Bean | 680 | 61106 | 14176 | 8424 |
| Sugarcane | 46 | 67323 | 40411 | 16228 |
| Wheat | 1457 | 37315 | 4543 | 4495 |
| Pea | 829 | 49768 | 7725 | 6371 |
| Mustard | 1429 | 31027 | 1912 | 6473 |

**RETURNS**

Returns from the Natural Farming and Conventional Farming are present in Table 7. Farmers were getting highest net returns per hectare from crop combination 4 (Rs. 325070) followed by crop combination 3 (Rs. 178205), crop combination 2 (Rs. 84775) and crop combination 2 (Rs. 78498) in the Kharif season. Farmers practising Conventional Farming were getting highest net returns per hectare from Sugarcane (Rs. 169035) followed by tomato (Rs.89161), French Bean (Rs.

64731) and Maize (Rs. 42268) in kharif season. From the given Table 7 below it can be seen that in both Kharif and Rabi seasons Natural Farming had higher returns in all combinations.

Output input ratio shows the amount of return gain by spending one unit of costs. When output input ratio was greater than one which shows positive net return if less than one it shows decreasing net returns over one-unit cost. Output input ratio of crop combination 1 to combination 7 was 2.5, 2.1, 2.7, 6.4, 2.5, 2.6 and 2.6, respectively. Empirical Investigation shows that output from per unit input in Natural Farming was higher in all combinations. Relative economic efficiency shows the percent change in net returns in the Natural Farming system over the Conventional Farming system. Relative economic efficiency is presented in Table 7. The REE of Natural Farming in crop combination 5 (570%) was highest, followed by crop combination 7 (124 %), crop combination 3 (107%), crop combination 4 (92%), crop combination 1 (86%), crop combination 2 (25%) and crop combination 6 (14%). From table 7 it can be concluded that farmers practising Natural Farming earning more income as compared to Conventional Farming

**TABLE 7.NET RETURNS COMPARISON OF NATURAL FARMING SYSTEM AND CONVENTIONAL FARMING SYSTEMS**

| Natural Farming | | | | Conventional Farming | | | | Relative economic efficiency of NF (%) |
|---|---|---|---|---|---|---|---|---|
| **Crops** | **Gross Return** | **Net Returns** | **Output input ratio NF** | **Crop** | **Gross Return** | **Net Returns** | **Output input ratio CF** | |
| Cereals-Vegetables-Pulses(1) | 132310 | 78498 | 2.5 | Maize | 104072 | 42268 | 1.7 | 86 |
| Cereals-Vegetables(2) | 164051 | 84775 | 2.1 | French Bean | 125837 | 64731 | 2.2 | 25 |
| Vegetable (3) | 282665 | 178205 | 2.7 | Tomato | 147279 | 89161 | 2.4 | 107 |
| Sugarcane-Vegetables-Turmeric (4) | 384762 | 325070 | 6.4 | Sugarcane | 236358 | 169035 | 3.5 | 92 |
| Cereals-Vegetables-Pulses(5) | 128215 | 76040 | 2.5 | Wheat | 48657 | 11342 | 1.3 | 570 |
| Cereals-Vegetables(6) | 134535 | 82034 | 2.6 | Pea | 146602 | 96833 | 2.4 | 14 |
| Cereal, vegetable & oil seed crop (7) | 117479 | 72332 | 2.6 | Mustard | 63307 | 32280 | 2.0 | 124 |

## CONCLUSION

In Natural Farming, all the farmers followed an intercropping pattern while in Conventional Farming most of the farmers followed monocropping. In Natural Farming and Conventional Farming, farmers were utilising 192 and 184 percent of land during one agriculture year for the cultivation of crops. The current study shows that in Natural Farming, Crop Equivalent Yield (CEY) were higher in all the crop combinations as compared to Conventionally grown crops

which indicates that Natural Farmers received high returns per hectare. It can be concluded that cultivation by natural farming methods has been found to be productive. This indicates that there is still a possibility of a rise in income from the adoption of Natural Farming through the use of own capital and a stronger marketing method. So, it is therefore suggested that a liberal policy be established to provide guidance in order to increase the adoption of natural farming technologies in the rural area. Also, the lack of awareness of growers mostly on correct utilisation of natural farming systems for agricultural production with regard to local microclimatic and agricultural conditions is the key reason for such farmers' virtual failure to respond to the suggested innovation. So, the involvement of extension workers in seeing and believing methods of extension practices is therefore of paramount importance.

**REFERENCES**

**1.** Anonymous. 2019a. Information and public relations Himachal Pradesh. http://himachalpr.gov.in/PressReleaseByYear.aspx?Language=1&ID=11892&Type=2&Date=25/04/2018 (8.00 AM, 27th June 2019).

**2.** Anonymous. 2018. Department of Agriculture, Himachal Pradesh. http://www.hpagriculture.com/ (4.00 AM, 27thjune 2019)

**3.** Anonymous. 2019b.Organic agriculture and Natural Farming. Department of Himachal Pradesh. www.Hillagric.ac.in/edu/coa/organic/index.html (2.15 AM, 17th July 2019).

**4.** Anonymous, 2016. Inspired by the Palekar model of zero-budget Natural Farming.https://www.indiawaterportal.org/news/inspired-palekar-model-zero-budget-natural-farming-gt-satish-today-successful-farmer (7.00 AM, 17th July 2019).

**5.** Babu R. 2008. Action research reports on Subhash Palekar zero budgets Natural Farming. Mysore Administrative Training Institute. 7p. Chand R, Lakshmi P and Singh A. 2011. Farm size and productivity: Understanding the strengths of small holders and improving their livelihoods. Economic and Political Weekly, 27: 5-11.

**6.** Gaurav Kumar and Amandeep Kaur. 2014. Factors Responsible for Cancer in Bathida Socio-Economic Impacts, International Journal of Advanced Research in Management and Social Sciences. 3. 8p.

**7.** Kaur, H., & Garg, H. (2014). Pesticides: Environmental Impacts and Management Strategies. Pesticides - Toxic Aspects. 44p.

**8.** József P, Károly P and János N. 2012. Pesticide productivity and food security, Agronomy for Sustainable Development,33: 243–255

**9.** Khadse A and Rosset PM. 2019. Zero budgets Natural Farming in India – from inception to institutionalization. Agroecology and Sustainable Food System 4: 5-6.

**10.** Khadse A, Rosset PM, Morales H and Ferguson BG. 2017. Taking agro ecology to scale: the Zero Budget Natural Farming peasant movement in Karnataka. The Journal of Peasant Studies 45: 192-219.

**11.** Munster D. 2016. Agro-ecological double movements. Zero Budget Natural Farming and alternative agriculture after the neoliberal crisis in Kerala. In Critical perspectives on agrarian transition: India in the global debate (Mohanty B ed.). 222–44 .pp.

**12.** Mishra S.2008. Farmer's suicides and agrarian crisis in India: Is there a way out. Indian Journal of Agricultural Economics63: 38–54.

**13.** Palekar, S. 2005. The philosophy of spiritual farming I. 2nd ed. Amravati: Zero Budget Natural Farming Research, Development & Extension Movement, Amravati, Maharashtra,

India.

**14.** Padmavathy, K., & Poyyamoli, G. (2011). Alternative Farming Techniques for Sustainable Food Production. Genetics, Biofuels and Local Farming Systems, 367–424.

**15.** Shetty SL . 2009. Agricultural Credit and Indebtedness: Ground Realities and Policy Perspective in Reddy ND and Mishra S. (eds.), Agrarian Crisis in India, Oxford University Press, New Delhi, p.61–86.

**16.** Tal A. 2018. Making conventional agriculture environmentally friendly. Department of Public Policy, Tel Aviv University, Israel. 17p.