

Comparison of Organic Farming and Conventional Farming In the Punjab, Pakistan

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Abstract— in our research, the comparative analysis between organic farming and conventional farming has been made to explore the agriculture economy in one of the provinces of Pakistan known as Punjab. Like other developing countries, Pakistan's large portion of economy is also dependent upon agriculture. So it has also adopted the ways of organic farming to increase the production, reduction of poverty and raising economic wealth to make the backbone of Pakistan strong. Moreover, with the perspective of production but results are astonishing and opposite. Instead of modern cultivation, it has reduced pesticide disease and weed not to build. It is also beneficial for the soil to in the better form of utilizing the methods of organic farming, farmers still using conventional methods of farming. Reasons have been discussed in the following sections. To perform the results, two main cities of Pakistan has been taken; Lahore and Multan and self-administrated survey is conducted in the agriculture areas of both cities to collect the feedback from the farmers with respect to organic as well as conventional method of farming. A sample of 91 questionnaires of both methods is used to conduct survey and gather the opinions of farmers and people related to agriculture. Experiments show the larger use of conventional methods of farming in Pakistan as compared to organic methods. Results of this study depict the adoption of conventional farming as compared to organic farming in Punjab, Pakistan. There are several reasons behind it which are addressed in the part of discussion.

Keywords: Organic, Conventional, agriculture, breeding, cultivation, Punjab

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1 INTRODUCTION

Survival of living things on the earth is impossible without cultivating food for their living purpose. Farming is a part of agriculture by which people known as 'Farmer' grow crops and keep animals to help them in cultivating the crops for them. Centuries ago, with the existence of life on the earth, farming became the earning source along with covering the needs of food. Initially it started on domestic level and then international level. Later on, it became the trade among countries from all over the world via import and export. The world is full of different professions and made up of various human interventions for the survival of life. The production and management of farms and cultivation of food is mandatory to fulfill the need of human beings. There has been a constant debate on organic vs conventional farming system by our nutrition experts. Many researchers from the field of agriculture and food manufacturing industries are working to find the way to explore the beneficial methods for the growing of crops. Among them, organic farming is considered to be the best approach for the reliability of farmers in several ways. This method is profitable for the farmers as well as highly beneficial in saving their time and effort to cultivate the crops.

Traditional agriculture (Altieri, Miguel, 2004) results in both community food production and the conservation of agro biodiversity. Conventional farming maintained for centuries but with the passage of time and after green revolution world has changed the pattern of farming towards organic farming. Only developed countries initially started adopting organic production of agricultural produce but now other countries are also demonstrating this technique. Likewise, developing countries where farmers are not well aware about organic farming but now with time trends of agriculture are changing and farmers are moving on with the trend to sustain in the era of organic farming system. Organic farming is the system of farming in which there is no use of synthetic fertilizers, growth hormones and pesticides. Organic manure composed of different material includes; farm yard manure, leaf litter, poultry manure and other mixtures in different compositions provide benefit to soil health, environment and also conserves money (Gowda et al., 2008). Users of organic methods have their own values which have been tested and validated in the study (Chrysosoidis, George and Athanassios Krystallis 2005). The survey in the study was conducted in Greece which depends on the list of values topology by taking internal and external values. LOV

makes the internal and external values distinct from each other. With the advent of Organic farming researchers briefly explained its methods, definition and history of organic farming along with its advantages (Beharrell and MacFie, 1991).

The climatic condition of Pakistan is dry and arid with low organic matter which can be more exploited with conventional fertilization. So adopting organic farming will help to improve the soil conditions of Pakistan (Azad and Yousaf, 1982). Agriculture contributes 20.9 percent to GDP (Gross Domestic Product) and it provides employment to 43.5 percent of rural population. High yields of crops and increment in agricultural productivity is prerequisite for food security. For reducing poverty in Pakistan and to make agriculture more effective for sustainable economic growth, different trajectory and policies framework needs to incorporate in a system. The focus point of government is to make agriculture more productive by giving special attention to horticulture, livestock and fisheries.

Agriculture production in Pakistan always remained submissive. Major factors results in low yield in Pakistan includes limited adoption of progressive farming techniques, misuse of input available for crop production, slow rate of technological innovation, problems associated with quality, quantity and timeliness of input supply, marketing and trade restrictions, pest and livestock disease problems and limited amount of credit for agricultural production (Economic survey of Pakistan 2015-16).

2 Hypothesis of the Study

By keeping in view problems associated with Pakistan farming system, present study was designed having following hypothesis;

- Organic farmers have a fine awareness and concern for environmental problems associated with agriculture as compared to conventional farmers
- Conventional farmers use conservative practices with less potential than organic farmers.
- Organic and conventional farmers differ in their demographic characteristics and in the structure of their farms.
- Conventional or traditional farmers have more economic orientation towards agriculture and are less willing to take economic risks than organic farmers.

Economic impact can be seen on conventional farming and organic farming. Conventional farming and Organic farming has been in trend by the farmers in cultivating their crops and people have carrying the conventional approaches by ancient years (farming, 2016). With the growing pace of technolo-

gy, it has taken place in agriculture sector. In the domain of agriculture, organic farming has replaced the conventional approach in order to improve the methods of farming for better production of crops and other frequent use of commercial pesticides. Some researchers have collected data from the literature by using qualitative approach in order to conduct the comparative study of organic and conventional approaches of farming (Woese, Katrin, et al). For this study, 150 investigations were done to compare the quality of both types of farming with the help of various fertilizing systems. However the results from these approaches were sparse and their summary presentation was difficult enough. Therefore, numerous factors which influence these types of farming system were also included in order to compare the studies.

3 Pros and cons of both methods of farming

Before moving towards the organic and conventional methods in detail this section will briefly explain the pros and cons of both type of farming.

3.1 Organic Farming

The advantages of organic farming have been stated by the researchers in the study of "Consumers attitudes to organic food" (Beharrel, and MacFie, 1991).

3.2 Advantages

- The problems of residual pesticides have been decreased
- Improvement of structure of soil
- It uses wastes and residuals
- It reduces the ground water pollution with the help of nitrates
- Organic food is more offered for the customers to fewer pesticides associated with human diseases.
- It is more sold in the markets (Forman et al, 2012).
- It has less environmental effects than conventional ones.
- Organic food has more vitamic C as compared to conventional food.

3.3 Disadvantages

- Organic fertilizers are to be use in the soil which can harm the soil
- Decay of organic matter is slower. It is not good for the growth of plants
- Labor input are required
- Manures can pollute the water
- It reduces production per unit of land

- There is a higher risk, information conflicts, indivisibility and un flexibility in managerial decisions in organic farming (Padel, 2001).
- It is a complex farming system which affects the overall system instead of single unit.

3.4 Conventional Farming

The advantages of conventional farming is as follows

3.5 Advantages

- It increases crop yields
- It makes the crops more fruitful
- It helps farmers be able to feed the world

3.6 Disadvantages

- It potentially harms the soil
- Resistance eventually grows to the farming methods
- Many countries ban conventional methods

The taste of organic farming and conventional farming varies (Weibelet al, 1998). Customers are concerned about the quality of apple produced by organic productions. In this study, the supermarket of Switzerland which sells apples from verified organic production. To investigate the quality of apples, following measures were taken place.

- i) Standard parameters were analyzed i-e; sugar, malic acid, firmness, mineral elements.
- ii) Parameters of tastes were checked by panel tests at repeated number of times Health perspective components were checked i-e; fibers, phenols, selenium, vitamin E and C
- iii) Fruit quality was checked by holistic methods by using crystallization which is also called image forming technique.

According to the experiments, organically produced apples had 15% higher taste than conventional ones. Overall tests shows that organically grown apples can have outstanding inner quality as compared to natural production of apples.

4 Materials and Methods

Trends in Agriculture in literature A researcher carried out a study at two different locations having varied amount of low and high input levels (Chuka having HumicNitisols, soil fertility and rain fall while Thika having RhodicNitisols, low soil fertility and annual rainfall) for comparison between conventional and organic farming (Adamtayet al., 2016). Conventional farming system received synthetic fertilizers along with or

ganic manure while organic farming system received organic manure only. Experiment comprises of six growing seasons, three years crop rotation. In long rainy seasons during the month of March- September maize (*Zea mays* L.) was grown while in the months of Oct-Feb vegetables were grown as these months received less rainfall. Different seasons showed varied results for both maize crop and vegetables grown. It was concluded that organic farming system is resource conserving, economically suitable, productive and have ability to sustain agriculture production in Kenya. Another survey was conducted to present a collaborative study including group of farmers to demonstrate nitrate (NO₃) leaching from organic farming (OF) and conventional farming (CF) on whole crop rotations in Seine Basin (France). Results depicts that average amount of N leaching in OF is 23 % lower (12.5±2.9 kgNha⁻¹ yr⁻¹) than that of CF ((16.2±6.3 kgNha⁻¹ yr⁻¹). However, this study provides innovative practices by adopting to decrease nitrate level in ground water (M. Benoit et al.2016). Researchers have scrutinized the performance of organic farming considering four important points including productivity, environmental impact, economic viability and social wellbeing. It was concluded from current review that organic farming produce low yields but are more lucrative, ecofriendly, able to produce nutritious food (having no or traces of residues of pesticides) and restore fertility of soil as compared with conventional farming system (Reganold and Wachter. 2016). In this study, researchers have made risk comparison associated with organic and conventional farming in the Netherland with respect to family farm income, underlying prices and production. For this purpose farm accountancy data network was used along with unbalanced data collected from 196 conventional and 29 organic representative Dutch farms. Period includes 2002 to 2011. It was concluded from present studied that organic farming had higher risk for family farm income as compared to conventional farming (Berentse and Asseldonk, 2016). In this research experiments have been performed at the Scheyern Research Farm in southern Germany including different farming systems (organic mixed farming, arable farming, agroforestry: conventional arable farming and agroforestry). It was depicted land used efficiency LUE of conventional farming was higher than that of organic systems. This was because of crop rotations, dry matter yields and biomass usage. LUE should be used in combination with agro-environmental indicators, in order to ensure both efficient and sustainable land use (Lin and Hülsbergen, 2016). Moreover, researchers investigated energy used and greenhouse gas emission in organic and conventional agricultural system in Netherland in 2013. It is measured that organic agriculture is characterized by decline of energy used and green house emission. It was investigated from current studies that energy used and greenhouse gas emission in organic farming is less than that of conventional farming system for production of milk. Energy use per milk in organic dairy is 25% lesser than in conventional dairy

however GHE are 5-10% lower (Jules et al., 2014). Researchers made meta-analysis to scrutinized comparative yield performance of conventional and organic farming system. Analysis shows that yield obtained from organic farming is lower than that of conventional farming. But these differences are highly contextual and depend upon characteristics of site, farming system and previous history of field. Organic system had 5 % less yield in legumes grown on rainfed zone and perennials on slightly acidic to slightly alkaline soils. Likewise 13 % reduction in yield observed when best organic practices were used. For establishment of organic agriculture for sustainability of production of food, different yield limiting factors should be deeply understood along with socio-economic and environmental benefits (Seufert et al., 2012).

This research work has adapted questionnaire for organic farming based on three scales with total 17 constructs. First is based on socio demographic indicating three groups of variable for the sample size coded as gender (male and female) and status (married and other). Besides this third variable indicate different group of education (1=Less than grade 12, 2=High school graduation, 3=Partial college/university, 4=Bachelor degree, 5= Post-graduate). Second portion of the questionnaire is based on the scale mentioned by Rogers, E.M, 1983, with seven constructs, third portion of the questionnaire consist of Environmental Scale (Dunlap & Van Liere, 1978; Kuhn & Jackson, 1989) with seven constructs and Economic Scale (Carr, S., 1987; Tait, E. J., 1982) with three constructs. The questionnaire prepared for conventional farming is based on environmental orientation and attitude orientation of the farmer (Napier & Camboni, 1988) with 8 constructs, from which 5 are attitude based and 3 are environmental based. Five-point Likert-scale statements were used for both organic and conventional farming questionnaire (1=strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree).

4.1 Conventional vs Organic with respect to economy of Pakistan

Researchers made comparative analysis of organic and conventional farming and carbon flux in vegetable farm. The study focused on carbon absorption which leads to increased organic matter content. It was determined through material flow analysis and readings were noted accordingly. Results will be studied by observing surface runoff and leaching. Low water flow was observed at Organic Farm as compare to Conventional farming. This study is essential to enhance in terms of economic development and environmental perspective (Honyeng and Agamuthu, 2014). Agriculture is the backbone to strengthen the economy of any country. With respect to Pakistan as well, it maintains the same importance as in other regions of world. It contributes almost 24 percent of Gross Domestic product (GDP) and supports as greatest source of

foreign exchange earnings (Statistics, 2016). Variations in prices ultimately affect the economy of the country. Price and production of crops is inversely proportional to each other. To maintain the production of crops to meet the need of country, technologists have introduced different methods of organic farming. It has not only raised the production of crops, yields and animals on yearly basis, it has also minimized the time and effort of farmers.

4.2 Data Collection

Questionnaire was collected from the survey of expert researchers in their findings and same questionnaire was distributed among 110 people including males and females. All of those people belong to the agriculture profession. After collecting the responses back from the respondents, there were 14 partially filled and 5 were not filled. There were 91 questionnaires left with the complete information. Both questionnaires consist of 182 forms. 91 were filled with respect to organic farming and 91 were related to conventional farming. The survey was conducted in dense rural areas of Punjab; the one is Lahore and another is Multan. Total population of Punjab is 101,391,000 in 2015. And Lahore and Multan are the biggest city of Punjab in which research survey had been conducted to gather the views of people mostly related to the agriculture. With respect to economy, organic ways are better as they consume less expenditure in order to produce the crops at large scale. But some reservations with respect to farmers are associated with it. On the other side, conventional farming takes a lot of time and budget of farmers with respect to the cultivation and growing of crops and other agriculture goods. But the quality of conventional farming is more trustworthy as compared to organic one. That's why still farmers of Punjab rely upon the conventional methods of cultivation and prefer to carry it with them over long period of time.

4.3 Experiments

To gather the analysis for our research survey, different categories of literacy were come across. Among them, the people belong to every standard of education and ages were considered on the condition of their association with the occupation of agriculture. The following graph shows all the categories of people who were met and questionnaire was filled personally. The graph of count of education is based on graduates, less than graduates, high school graduates, post graduates and partial college degree. Then after findings, the great ratio of less than graduates was obtained which can be seen in the bar graph below. It means the literacy rate in the field of agriculture is low which itself is interesting findings with respect to Pakistan literacy rate.

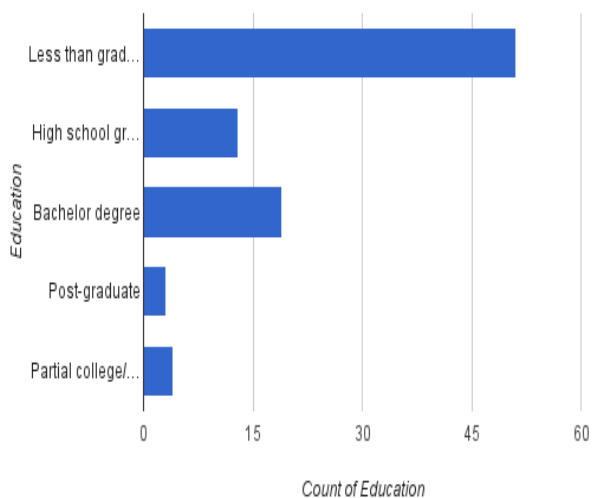


Figure 1: Literacy Rate

The distinction among bars has been shown in blue color. After obtaining the results of literacy rate in the farmers and the people belong to this occupation, they were classified in the form of gender. And according to the results there were total 67.8% male and 32.2% female belonging to the farming. In the following pie graph, red portion shows the female community and blue shows the male community.

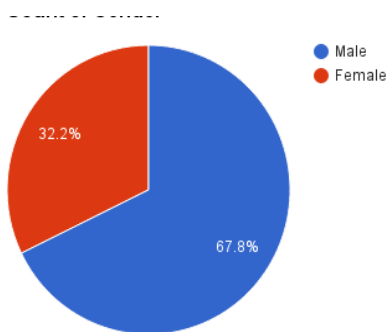


Figure 2: Gender Classification

Another finding is the classification of, marital count of the people who contributed in conducting this survey while filling up the questionnaire and according to the results, distribution of married and unmarried has been shown in the form of classification such as; 48.9% people were found who were married and rest 51.1% were supposed to be unmarried based on the results collected. Red color indicated unmarried community and blue indicates married community.

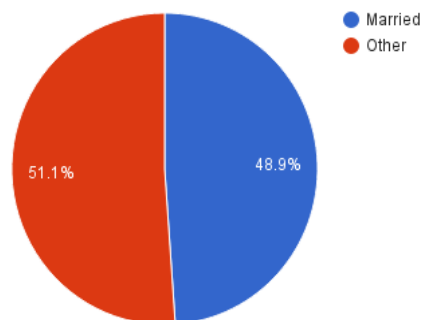


Figure 3: Marital Count

Overall count of education in the sector of agriculture has been shown in the form of graph below. According to the results education count in agriculture is raised up to astonishing limit. The questionnaire built upon the questions and the variations among these questions has been shown graphically. Among the questions from all the questions behave independently.

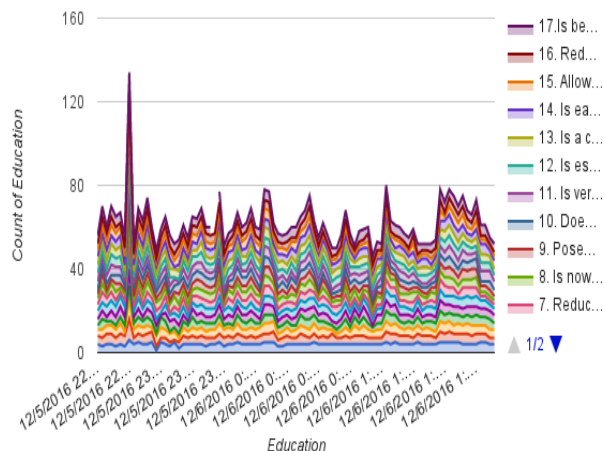


Figure 4: Overall variation in data

While performing the experiments upon data collected during survey. Two questionnaires were constructed separately. The one is related to organic farming and another is related to conventional farming. We are using comparing and contrast approach to prove the results. After gathering data, results have

been analyzed based on the same area of different types of farming adoption sectors. One sector is based on conventional farming and another one is based upon organic farming. Below graph shows the variation of conventional farming by using collective questions which were filled by the farmers who have adopted this approach.

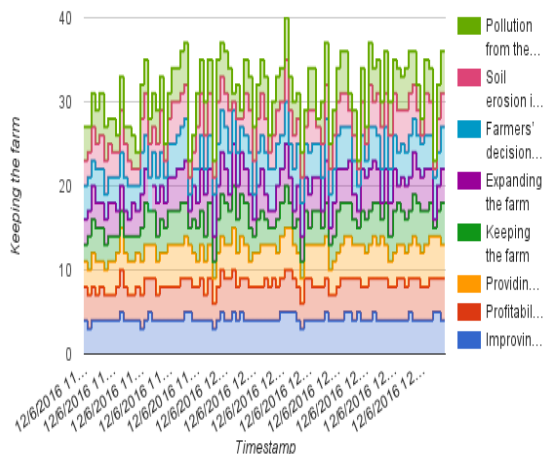


Figure 5: Variation in Conventional Approach

Mean, median and mode are three different methods to determine the averages of set of integers (Company, 2016). However all these three methods help statisticians to compute the average but the results from all these averages vary from each other. These measures are calculated to obtain the single value to identify the central position of data. Such measures are applied on numerical and statistical data to obtain different variations inside them. These are all central tendencies but with different conditions. Applicable of these measures are different based on scenarios (laerd, 2013).

5-Results

Above discussed central tendency measures have been applied on data and results have been collected. The results obtained from such measures have been calculated by using the tools SPSS and MS Excel. The outcomes of such experiments have been shown in the form graphs separately. The results from both approaches have been interpreted in the form of graphs. Such presentations of graphs have been shown below:

5.1 Conventional farming

The central tendency measures of conventional farming have been calculated in SPSS and graphs have been interpreted in MS Excel. The results based on data collected from conventional method users or supporters have been presented in the form of table below:

Sample constructs	Mean	Median	Mode
1. Improving soil quality	4.16	4	4
2. Profitability of farm	4.18	4	4
3. Providing a healthy product	4.17	4	4
4. Keeping the farm	3.65	4	4
5. Expanding the farm	3.7	4	4
6. Farmers' decisions can have an important effect on the environment	4.06	4	4
7. Soil erosion is a serious problem on your farm	3.68	4	4
8. Pollution from the use of agricultural chemicals is a serious problem on your farm	3.66	4	4
Overall Average	3.9075	4	4

Table 1: Results of Conventional Farming

The resultant tables consist of all three measures; Mean, Median and Mode which has been shown in the form of column and graph as as below:

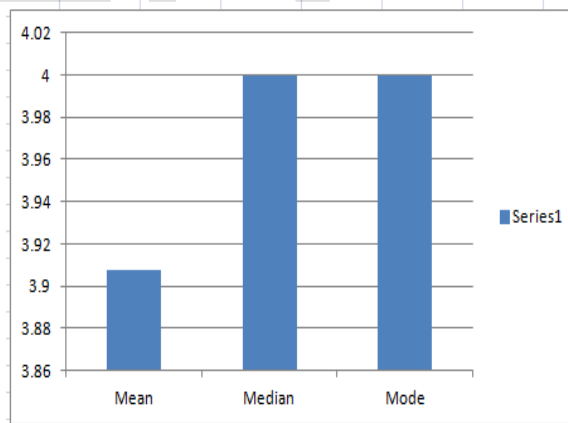


Figure 6: Comparison of Central Measures

According to the results, all these centralities have performed in their own directions. Median has outperformed other than mean and mode. Median value depicts the ordinal variable as compared to other ones. The results have been shown in the form of graph as a whole.

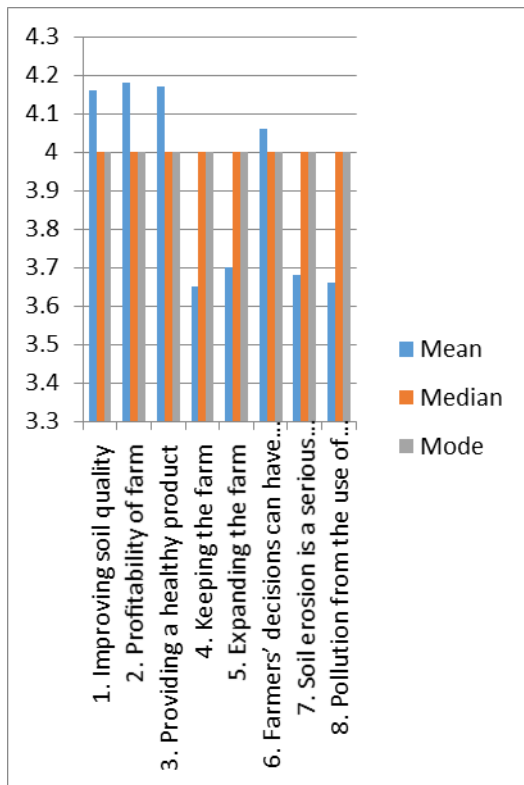


Figure 7: Overall Results of Conventional Farming

The data has been interpreted in the form of column graph in which every question has its own associated mean, median and mode and the comparison among them is distinguished with difference in colors.

5.2 Organic farming

The central tendency measures for organic farming has been computed and presented in the form of graphs by using SPSS and Ms Excel as similar as computed for conventional farming. Such results have been shown in the form of table as below:

Sample constructs	Mean	Median	Mode
1. Is it profitable way to farm	4.05	4	4
2. Saves time and effort	3.8	4	4
3. Is easy to understand	3.95	4	4
4. has low operating cost	3.34	3	3
5. Is easy to try out	3.71	4	4
6. Get quick results	3.84	4	4
7. Reduce weed problem	3.34	4	3
8. Is now restricted to carefully tested chemical	3.57	4	4
9. Pose no long lasting risk to the environment	3.12	2	3
10. Does not cause significant harm to wildlife and game	3.38	4	4

11. Is very effective in reducing crops losses in short term.	3.56	4	4
12. Is essential to ensuring high agricultural production.	3.73	4	4
13. Is a cheap way to protect crop and improved productivity yield	3.75	4	4
14. Is easy to apply	3.82	4	4
15. Allow us to keep on top of pests, disease and weed so they don't build up	3.27	4	3
16. Reduce long term risk of crop loss due to pests and weed	3.01	4	3
17. Is beneficial to the soil	4.21	4	4
Overall Average measures	3.615	3.82353	3.7059

Table 2: Results of Organic Farming

According to the results of table same measures; mean, median and mode has been calculated and the results are distinguished from the results of conventional one. Another fact in the result is the difference of questionnaire methods. The questionnaire is composed of 17 questions. Following graph is representing the performance of measures.

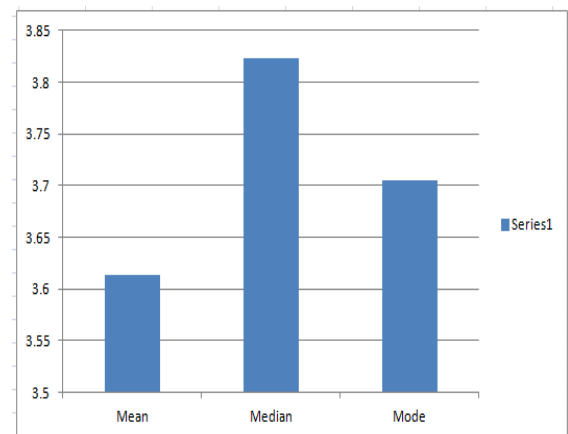


Figure 8: Comparison of Central Measures

All the questions have been presented below the bars in the column graph and mean, median and mode have been distinguished with the help of three colors; blue, red and green.

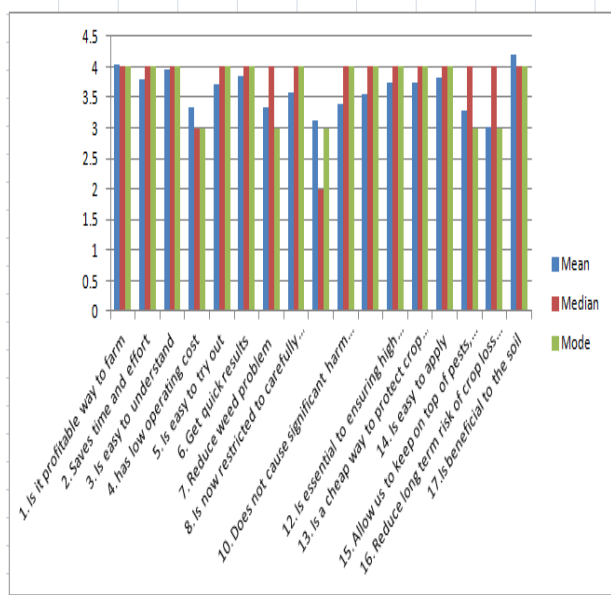


Figure 9: Overall Results of Organic farming

Variations of responses have been shown above.

6- Discussion

Different studies have been conducted to justify the comparison between organic and conventional methods of farming in different regions of the world. Our study has conducted in Punjab Province of Pakistan which itself a distinct study with no comparison with other studies presented by different authors. After acquiring the results from both terminologies, interesting findings have obtained. The findings reveal the equivalent performance of median and mode under conventional farming system. Contrary to conventional approach, the organic approach shown the performance of median significant one and then mode and least one is Median. As discussed earlier, all three approaches have different applications respectively. Mean shows the overall average of numerical data whereas median supports the central value and mode also works like median but with the most frequent value. While comparison between Organic and Conventional method with respect to farming, results reveal that the use of both approaches varies from people to people in any area. For the experiments, the rural areas of Punjab have been taken and questionnaire survey has been conducted. According to the results, people from Punjab support conventional methods of farming which are shown below;

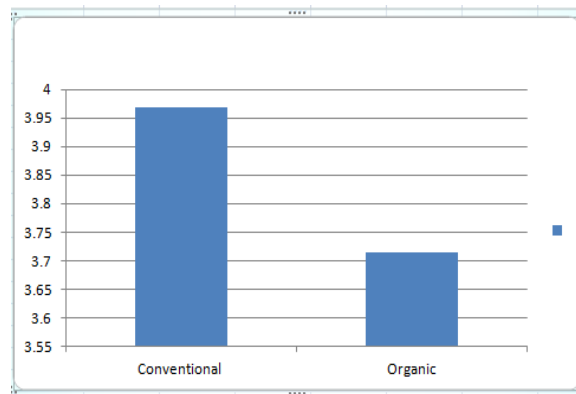


Figure 10: Conventional Vs Organic

Realistically, organic farming has raised the yearly production and profit up to four times higher than conventional one. But according to the survey ratio of people who uses still conventional methods of farming is greater than organic users. This survey proves beneficial in making the assumptions of other researchers strong enough related to conventional farming. Farmers of the selected areas still prefer to use conventional methods of farming. Major contribution of this research in area of agriculture science is that, people still do not consider the organic methods of farming trustworthy and beneficial for growing their crops. In other side, organic ways of production has been widely used in breeding the animals. For example in poultry farming, the use of breeding is up to larger scale. Moreover, the use of organic ways has taken place in other countries like Kenya, France as discussed in literature. There might be chances for organic methods of cultivation to be renowned in Pakistan but still it will take time to grab the attention, trust and dependability of farmers. With respect to Pakistan economy, it is suggested that farmers need to use organic farming methods to in order to raise their yearly cultivation as other countries are making their economy strong by this way in the field of agriculture. Countries who do not move with the trend using by relative countries can have lack of economy development source and become the weaker in getting up to the level of wealthy countries. Organic methods of cultivation are also secure and hygienic therefore farmers of Punjab are suggested to move with technology and use latest methods of agriculture in order to strengthen their roles and raise the production and economy of Pakistan in the field of agriculture. The results are highly beneficial in advising the Pakistan agriculture system to use the new methods so called organic methods of farming too. It will not only benefit the farmers to reduce their cultivation effort but also improve their effort time and income from their crops.

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