CHAPTER- 6

Data Analysis

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CONTENTS

6.1 Introduction

The researcher along with doctrinal method also used non-doctrinal method with an intention to produce a research work which would be supported by data. In this chapter the researcher tries to analyse and interpret the data collected. The research tool used was a semi structured questionnaire which was filled in by farmers of Vadodara district. The researcher has used homogeneous purposive sampling because of similar characteristics of samples. Farmers of Vadodara district, who use different seeds, have been selected for homogeneous purposive sampling and that allowed the researchers to infer information about a population, without having to investigate every farmer.

The study has been conducted on Rights of Farmers with reference to IPR and laws relating to Seed in India. Researcher has collected the data from hundred farmers. Further researcher intends to study the effect in change of the cost of production and yield due to use of new types of seeds adopted by farmers for cultivation and to see their impact on quality of soil and does this GM seeds involve more technicalities in terms of cultivation process along with applicable laws related to seeds.

6.2 Methodology

The researcher has used non doctrinal method for **Objective no.5.To examine the effect of Genetically Modified Seed on Indian Farmers.**

6.3 Population

Farmers of various villages of **Vadodara District**

6.4 Sampling Techniques

The researcher has used homogeneous purposive sampling where samples are selected because of their similarity of work. Farmers of Vadodara district, who use different seeds, have been selected for homogeneous purposive sampling.

6.5 Sample Size and Nature

The researcher has used homogeneous purposive sampling technique for data collection. The sample size comprised of **one hundred** samples. All the Samples were the Farmers residing in different villages of Vadodara District.

6.6 Data Collection Method

The researcher used Semi-structured questionnaire as a data collection tool. The questionnaire was being explained to farmers and filled accordingly. The questionnaire had both structured and semi-structured questions. The questionnaire is attached as Appendix A.

6.7 Research Ethics

All the respondents were informed of the context of the study and the use that would be made of their data through the following introductory content on the questionnaire:

The following questionnaire has been prepared for research on the topic "A study of Rights of farmers with reference to IPR and Laws relating to Seed in India." The researcher intends to study the effect in change of the cost of production and yield due to new types of seeds adopted by the farmers for cultivation and to see their impact on quality of soil and does this GM seeds involve more technicalities in terms of cultivation process along with applicable laws related to seeds and provide your suggestions. The questionnaire includes open-ended as well as close-ended questions which may be filled up accordingly. (i.e. for open-ended questions, kindly give your personal opinion while for close-ended questions, kindly select one of the options given against the question). The information provided shall be used for research purpose only and details of the subject shall be kept confidential.

6.8 Analysis of Data

Percentage and frequency method shall be applied to analyze the data. The data collected from the questionnaire is analysed and represented in pie chart, bar chart and column chart. Analysis of Data has been group among Part A and Part B. whereas Part A covers personal details regarding the farmers and Part B covers

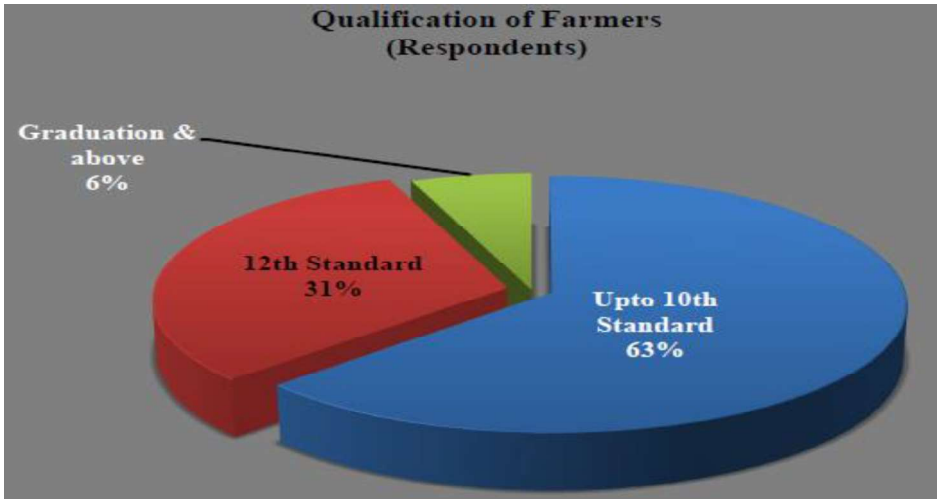
responses of various questions answered by farmers regarding farming, Saved Seeds, GM Seeds, effect on soil, yields, fertilizers, training, subsidy, experience with GM Seeds and options. Detailed responses of farmers are analyzed below.

6.8.1 PART- A

Part- A of data analysis would contain personal details of the farmers like their qualification, age and size of their farming land.

6.8.1.1 PERSONAL DETAILS:

(a) Qualification of Farmers



Qualification of Farmers

Inference: 63% of the total respondents are those farmers who have not completed their basic education upto 10^{th} standard while only 31% have cleared their Higher education i.e.12^{th} standard of school and only 6% have completed their graduation or studied further.

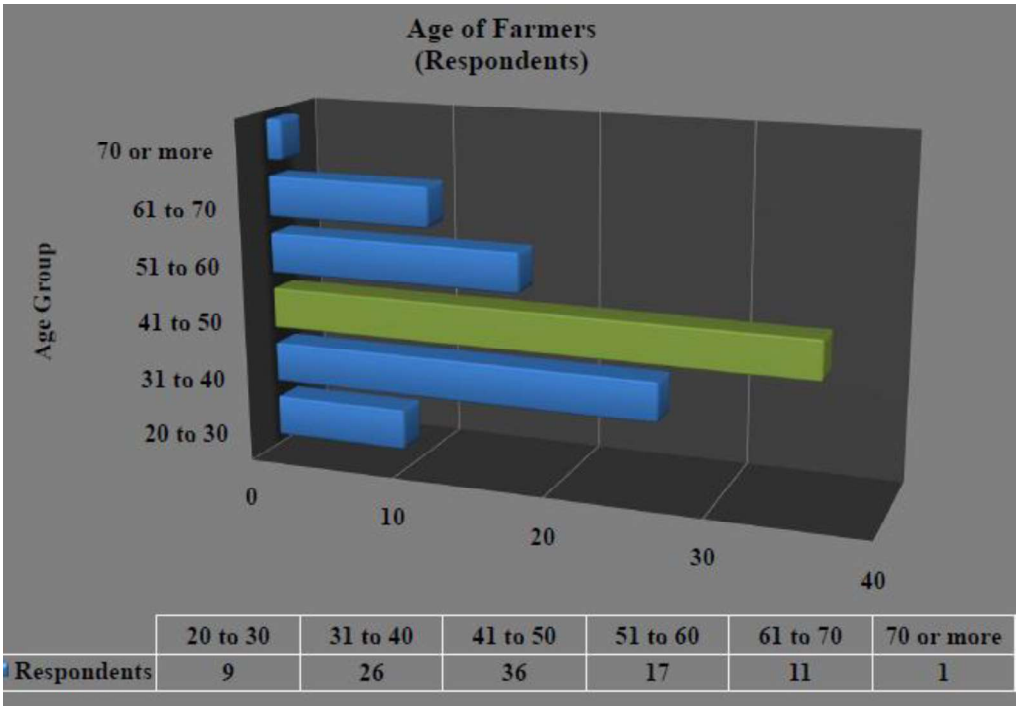
Qualification	Respondents
Upto 10th	63
12th	31
Graduation & above	6
Total	100

In India were agriculture is the backbone for large number of population. So the farming is the basic source of their income. The changing scenario has recorded agriculture more as a business proposition than merely tradition at least in the agriculturally progressive states.

Only 6% of the samples were graduates. Whereas, around 63% had studied only upto 10^{th} standard. This show that large number of farmers had a mindset education is not important for farming. It's only the hereditary knowledge which helps them in agriculture.

The reason why researcher has asked this question is that education plays an important role. If more number of farmers are educated, then it will help them to know about their rights and remedies available to them and to understand the present laws. Farmers do give more preference to farming then to education as they believe they can learn farming through the knowledge given to them by their forefathers.

(b) Age of Farmers



	20 to 30	31 to 40	41 to 50	51 to 60	61 to 70	70 or more
Respondents	9	26	36	17	11	1

Age of Farmers

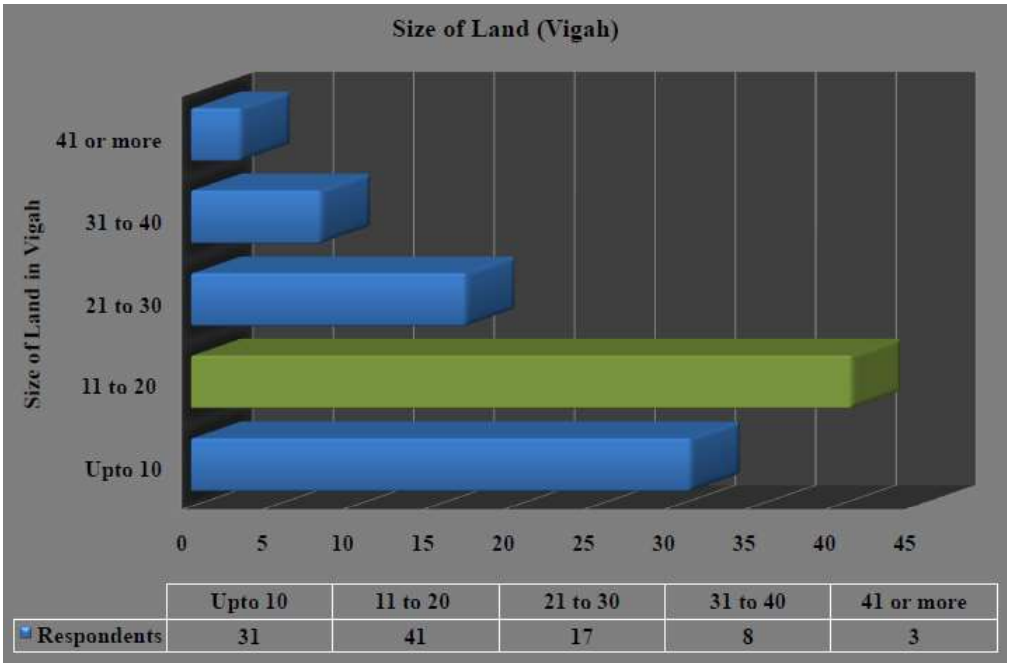
Inference: Out of 100 respondents 36 % belong to age group of 41 to 50 and 26% belongs to age group of 31 to 40 apart from this 17% belongs to age group of 51 to 60 and 11% belongs to age group of 61 to 70. Age group 20 to 30 has 9% respondents and only 1% respondent was from age group 70 and more.

The farmer was divided into 6 six age groups starting from 20 to 30 years and ending up at 70 years. The object of this question was to examine which age group prefers more of farming. Many reasons can be owed that why do young farmers ranging between 20 to 30 years of age group are changing their sectors and one of them can be commercialization of seeds, sale of land etc. Researcher has tried to get an outcome how the experience in farming will help the research to understand are GM seeds more benefited for farmers.

It was observed that younger age group favors less of agriculture above other availabilities. Only 9% of the farmers ranging between age group 20 to 30 years

prefer farming. Whereas farmers ranging from 31 to 40 years age group 26% of the farmer still prefer to go for agriculture as these have tried their hands in agriculture over the years. Maximum number of farmers were be found in the age group ranging from 41 to 50 years which is around 36 % as these are middle-aged farmers who are into agriculture business from many years. Only 17% of the farmers have inclination for agriculture between the age group 51 to 60 the reasons which are where most of them have given their lands on a rental basis for agriculture purpose or have made sub partitions of the lands among their children's for new generations. Thing was being established between the age group of 61 to 70 years where only 11% farmers where found still doing farming as only 1% was found still doing agriculture with his grandchildren who was under the age group of 70 and above.

(c) Size of Land (Vigah)



Size of Land (Vigah)

Inference: 41% of the farmers possess 11 to 20 Vigah, 10 Vigah was a land owned by 31%, 21 to 30 Vigah was owned by 17% of the farmers, Just about 8% of the farmers own the land between 31 to 40 Vigah and Only 3% of the farmers have 40 Vigah.

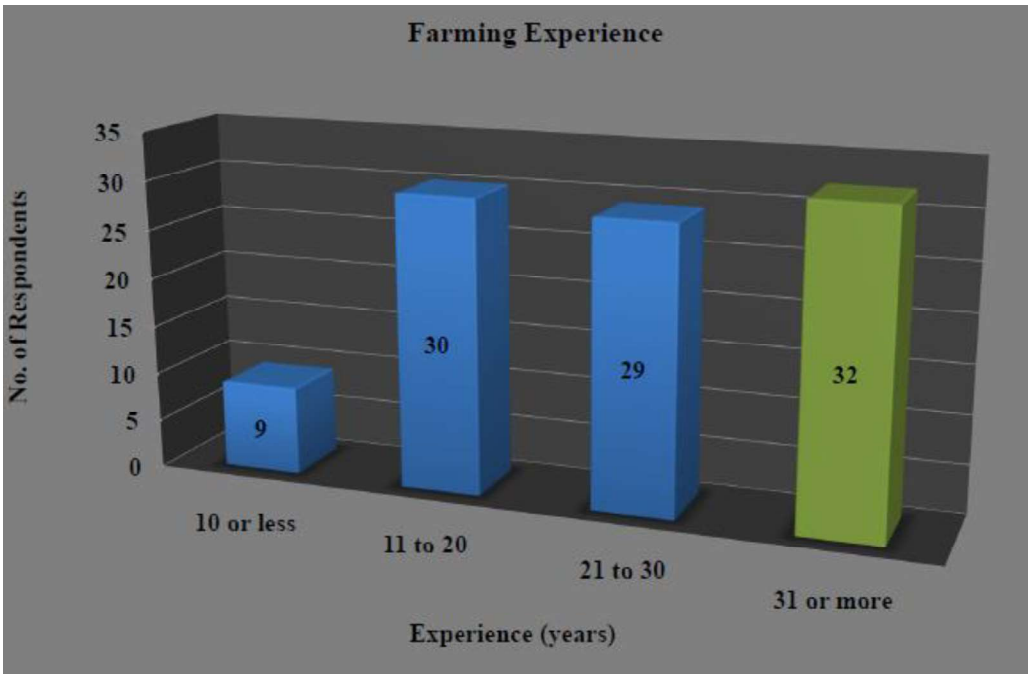
The Researcher has tried to find the size of land each farmer possesses approximately. Data regarding size of land was collected from 100 farmers where the land was marked in Vigah. Upto 10 Vigah was a land owned by 31% of the farmers which was the second highest in the list so this denotes farming trends which is tilting towards less area of farming where is 41% of the farmers possess 11 to 20 Vigah of land which is possessed by large number of farmers. Size of land from 21 to 30 Vigah was owned by 17% of the farmers which is now on a decreasing rate when we move towards higher number of land owned by farmers. About 8% of the farmers own the land between 31 to 40 Vigah which is on the decreasing rate due to many reasons one of them is increase in the size of family and due to which land is sub divided. Only 3% of the farmers have 40 Vigah or more than that land.

6.8.2 PART- B

Part- B would contain responses of various questions answered by farmers regarding farming, saved seeds, GM Seeds, effect on soil, yields, fertilizers, training, subsidy, experience with GM Seeds and options.

6.8.2.1 FARMING:

1. How many years farming experience you have?



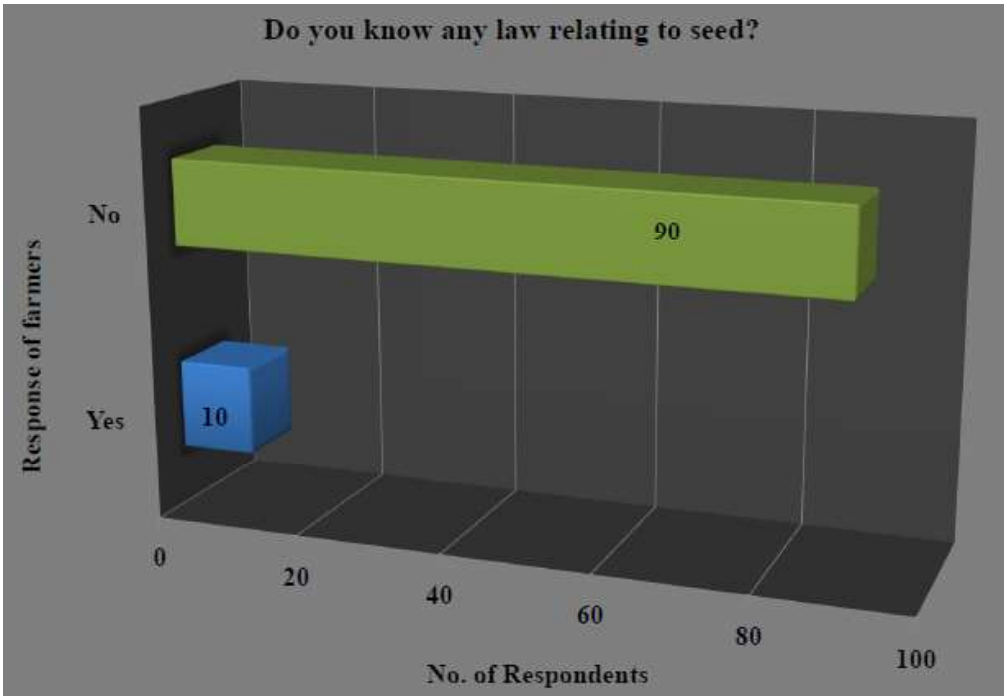
Inference: The number of years of experience possessed by the farmers.

Experience (years)	Respondents (Farmers)
10 or less	09
11 to 20	30
21 to 30	29
31 or more	32

The researcher wanted to know how the experience in number of years for farming or agriculture has helped the study in the positive direction and how it is the main source of question which will give direction whether experience farmers have certain preference or not. Experience in years is divided further into four parts where 9% of the farmers have less than 10 years of experience when it comes to agriculture reason behind is most of them are very young and have just started doing agriculture. Second ratio from 11 to 20 years the number is literally high which is around 30% of the farmers have agreed they have some experiences of 20 years around who are into the agriculture business from their initial days of work. Third ratio which is from 21 years to 30 years of farming experience 29% of the farmers have agreed they are into this business since last 30 years. Whereas 32% of the farmers have the experience of more than 30 years in agriculture, these are those farmers whose age falls between 40 years to 60 years.

Experience in agriculture has helped them in many ways as from the years of their experiences it can be viewed that which types seeds are more preferred by the farmers in the long run and how there is a shift or tilt in their agriculture by coming of the genetically modified seeds and also to understand are the farmers aware about their basic rights which are given to them through law and to check awareness of any laws relating to seeds.

2. Do you know any law relating to seed?



Law relating to seed

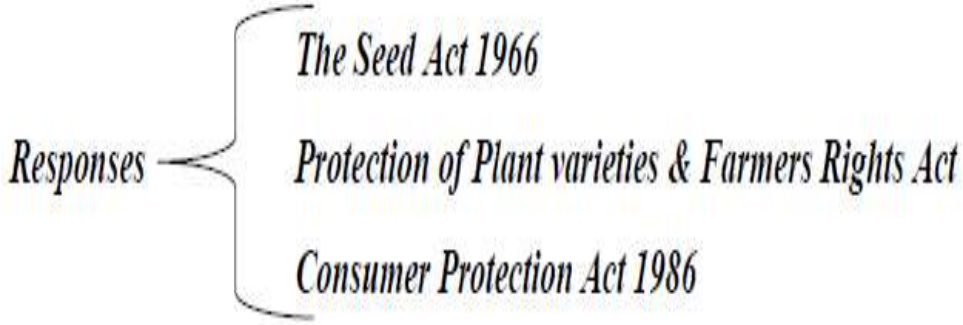
Inference: 90% of thefarmer responded that they are not aware about laws whereas, only 10% are aware about the laws.

The object of this question was to know whether the farmers are Aware of law relating to seed. Where the question was asked to 100 farmers that do they know any law relating to seed. Majority farmers were not aware about any such law they said they have heard about subsidy but not aware about any act relating to seed still many of them were having somewhat idea on land acquisition laws. Only 10% of the farmers had the heard about the law relating to seed.

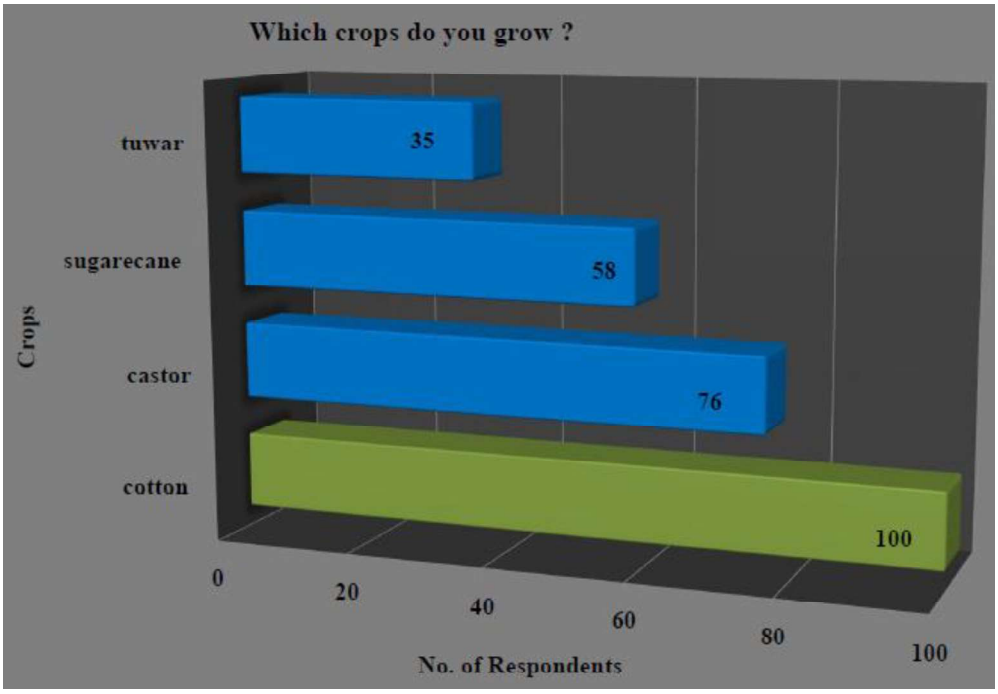
3. If yes, Please name them.

Farmers who responded to the question as yes that they are aware about the law relating to the seed were only 10% out of the 100 farmers. Out of that 10% only three farmers were able to name the present seed act properly and rest said they have heard about some law.

Below pictorial chart represents the responses given by farmers



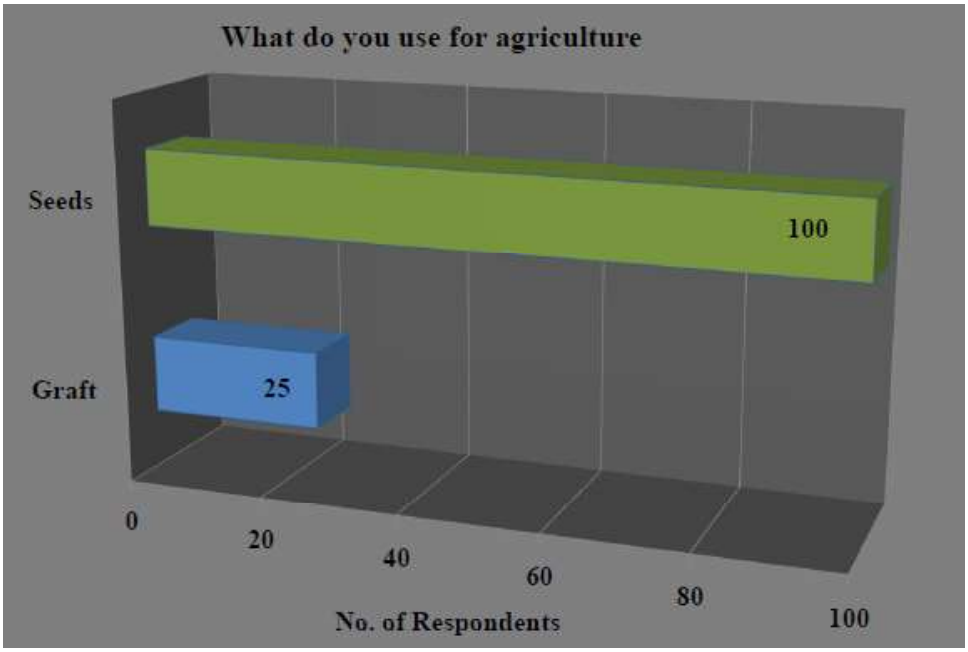
4. Which crops do you grow?



Inference: 100% farmers of prefer cotton over other, second preference is on castor 76% , third on Sugar cane by 58% and last is on Tuwar Dal by 35%.

Researcher wanted to knew the preference of farmers for selecting the crops for cultivation. Question was asked to 100 farmers that which crop they grow and surprisingly all the 100 % farmers gave preference to the cotton crops as the area were the research was being conducted is more fertile land for cotton plant cultivators. The second priority was given to the Castor were 76 % farmers said it's their second option after cotton crops. Third option was given to sugarcane as it is grown from graft (and not seed) and some farmer had an opinion it is rather tougher than growing cotton. Also cotton is preferred more because it's a cash crops and more profit can be gathered from it. Last and the fourth choice was given to the pulse Tuwar Dal were only 35% gave it as the inclination. The overall liking was given to the Cotton crop may be because of easy availability of seed in the market. Most of the seeds available are the genetically modified seeds and there cheap availability has tilted the farmers to grow the cotton. Selling is also found easy in the case of cotton compared to Sugarcane or Tuwar Dal which is to be sold to the mill owner.

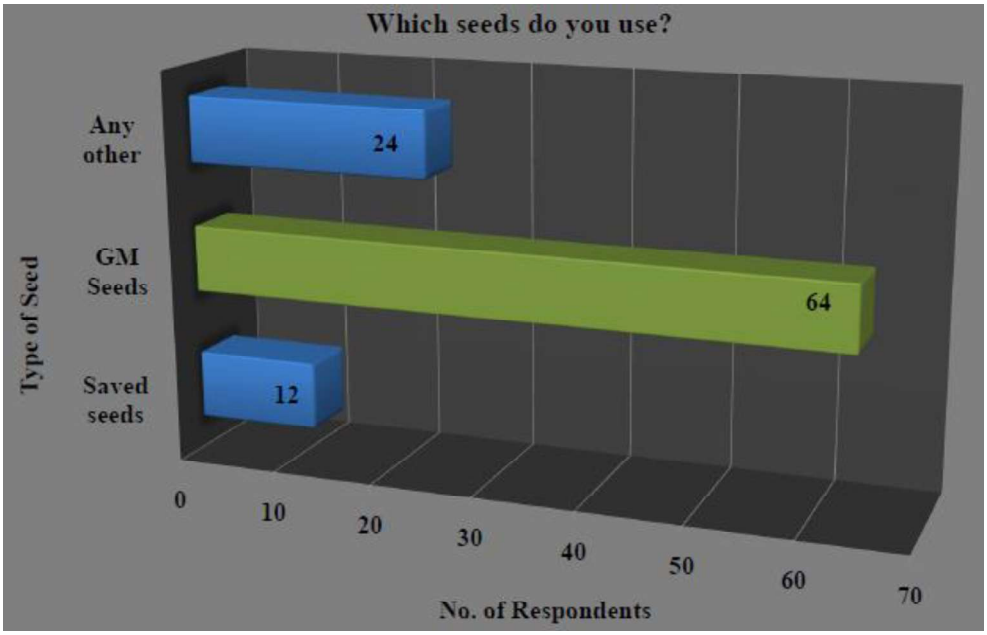
5. What do you use for agriculture?



Use for Agriculture

Researcher asked the question what farmers use for growing crops whether seeds or graft. All the 100% farmers replied that they use the seeds for growing crops. 25% said they prefer graft for growing crops only if they are growing the sugarcane as it can be done through graft only. As according to them graft needs more amount of water for cultivation and security of growing in graft is more as there growing chances are more compared to seeds. Whereas crops like Cotton, Castor and Tuwar Dal are grown through seeds. As it is easy to use seeds rather than using graft.

6. Which seeds do you use?

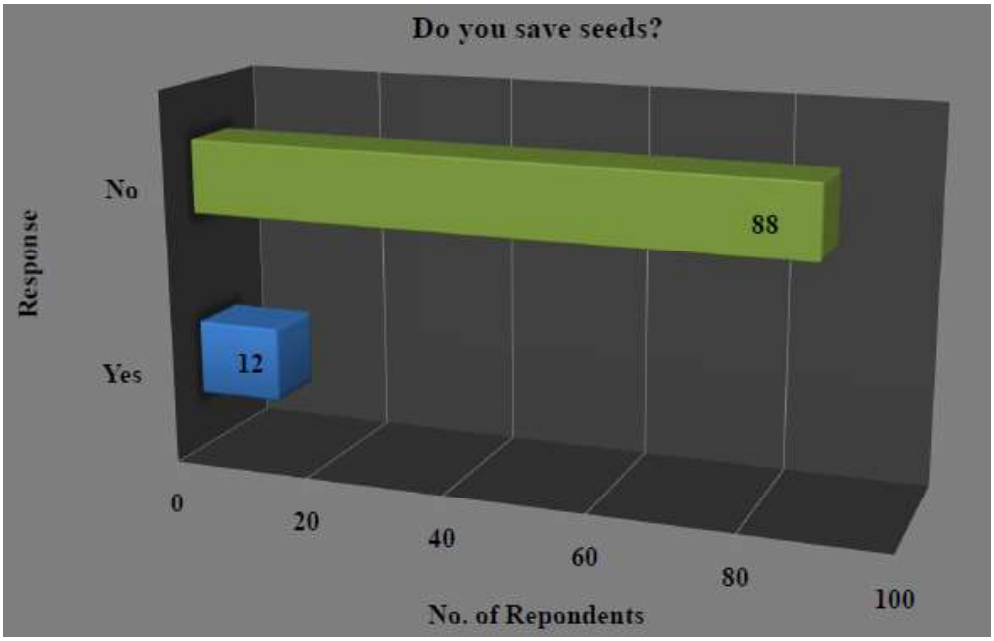


When the researcher asked this question, which type of seeds they use for cultivation Out of 100 farmers 64 % replied to that they use GM seeds for cultivation. The researcher got mixed response. Whereas only 24% farmers said they use other seeds which are either combination seeds or the hybrid seeds for cultivating crops. And, further, only 12% farmers still use the saved seeds for their land.

Each category of users had their own reasons for using or nor using a particular type of seeds. The 64% who were using GM Seeds preferred as they are cheap and easy to purchase from the market and the yield is comparatively higher compare to the saved seeds. While the 24% farmers who used the saved seeds preferred it as it was organic and cheaper than GM seeds and also the saved seeds maintain the quality of the soil. They believed that GM seeds are spoiling the market as saving them as a seed for next year is not worth as these seeds have deteriorating quality so saving them for next year won't be giving desired results.

6.8.2.2 SAVED SEEDS:

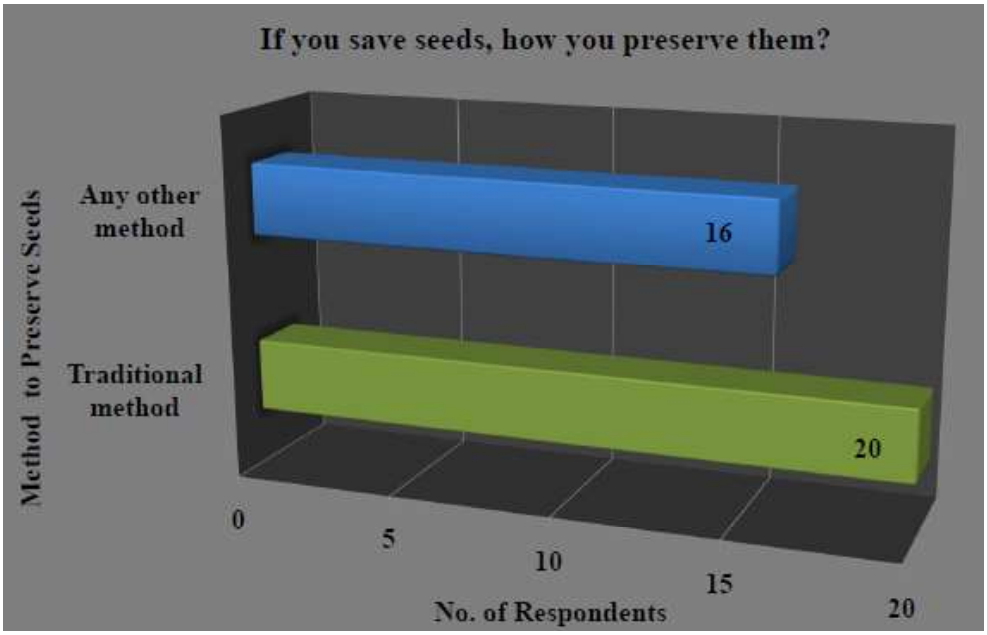
7. Do you save seeds?



Inference: Only 12% use the saved seeds whereas 88% use GM seeds for cultivation.

Although Saved seeds are cheap in cost to save and can be saved with the help of traditional method, only 12% of the farmers prefer them. While because of modernization and easy availability of seeds in the market majority farmers use the GM seeds as they give more outcome compared to the saved seeds.

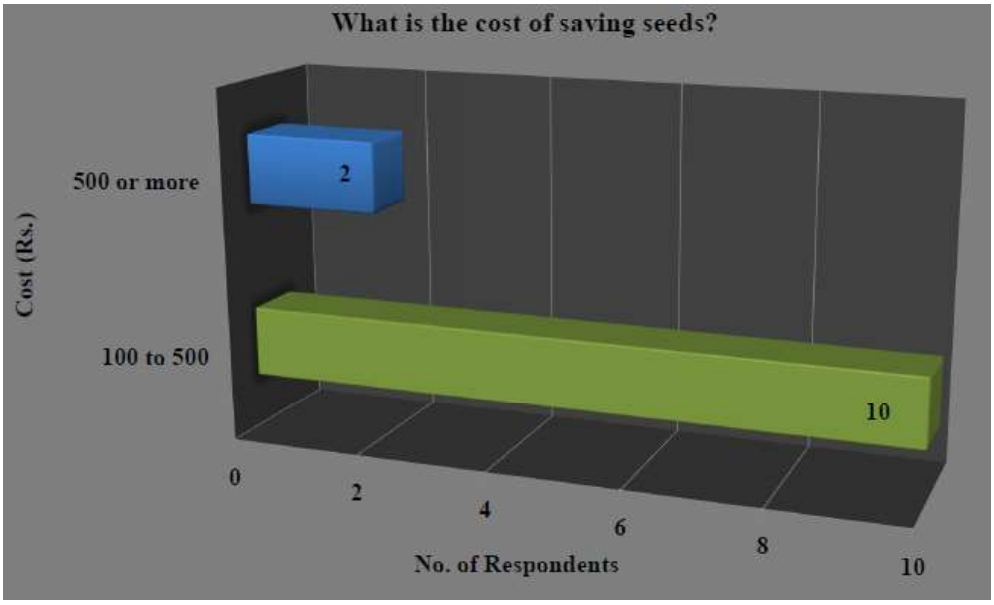
8. If you save seeds, how you preserve them?



Researcher asked this question to know the various preserving method used by the farmers who mainly use the saved seeds whether saved by them or being taken as barter from there farmer friend.

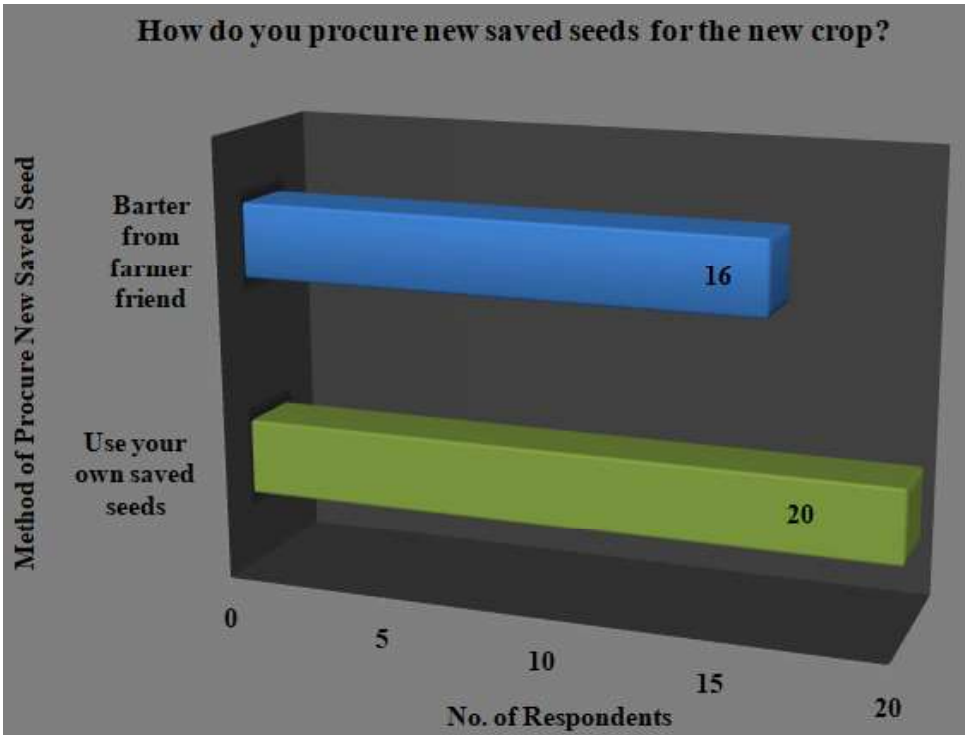
In which 16% of the farmers said they use any method for saving seed and 20% agreed on saving the seed through the traditional method. The specification for any other method is the mixture of traditional and other method came up with the time. Whereas the traditional method for saving the seeds in preferred by the higher age group person who are using it since very long. Even traditional method is very cheap compare to modern technique.

9. What is the cost of saving seeds?



Inference: Maximum farmers said cost of saving is less than Rs 500 and only 2 farmers said its more than Rs 500.

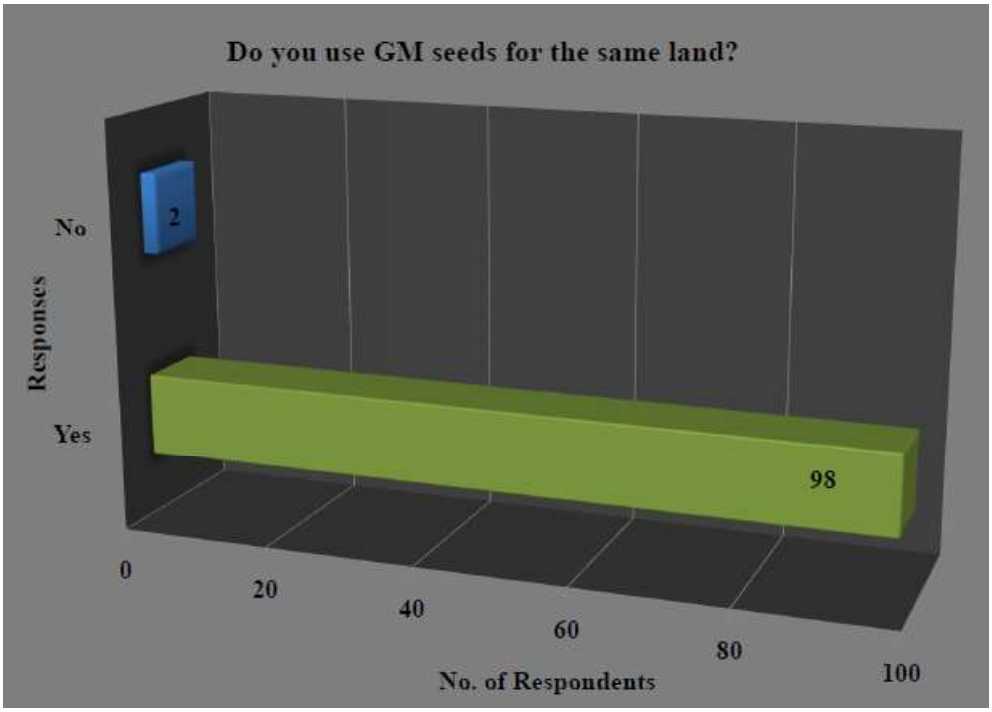
10. How do you procure new saved seeds for the new crop?



Inference: 56% farmers out of 36 farmers use their own saved seeds whereas 44% framers do prefer to use the bartered seeds.

The above 20 farmers are those farmers who prefer to save their seeds for personal use or for the bartering them to their friend farmer. On the other side there were 16 farmers who preferred taking seeds from their farmer friend through barter system. As some farmers use this barter system on the basis of the condition of last year's crops. As they take the seeds from those farmers whose seeds were of good quality.

11. Do you use GM seeds for the same land?

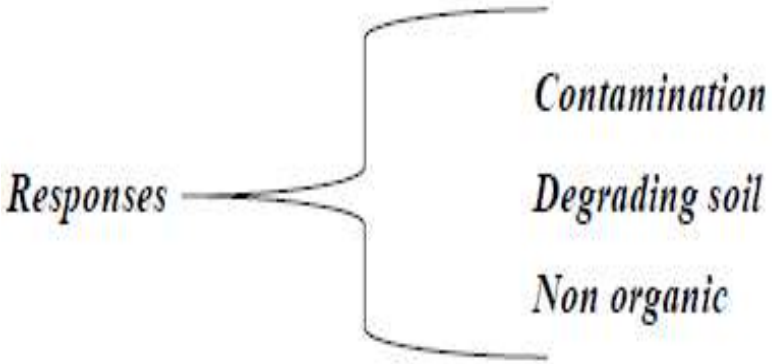


Inference: 98% of the farmers use GM seed.

The question was asked to all respondents about do they use GM seed on the same land for which almost all farmers have gradually move towards using of the GM seed over the years so 98% have agreed that they use GM seed on the land. As in exclusive, 64% of the farmers use only GM Seeds but even other farmers also showed that if they would use GM seed it would be on the same land.

12. If No, why?

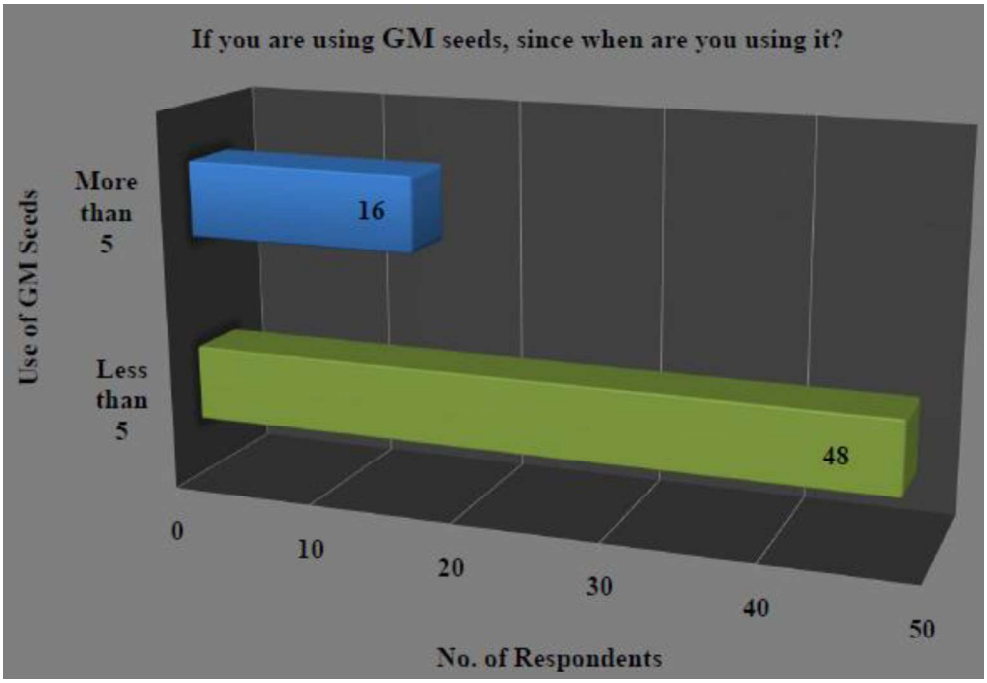
Various reasons were given by the respondents for not using the GM crops on the same land.



These above are the some of the reasons which are being given by the farmers who don't prefer to grow GM crops on the same land. One of the important reasons is contamination which can be affecting the organic crop and damaging them. Even the land is contaminated by the frequent use of the GM crops so if organic or hybrid crop are grown separately then they don't have such effect on them.

6.8.2.3 GENETICALLY MODIFIED SEEDS

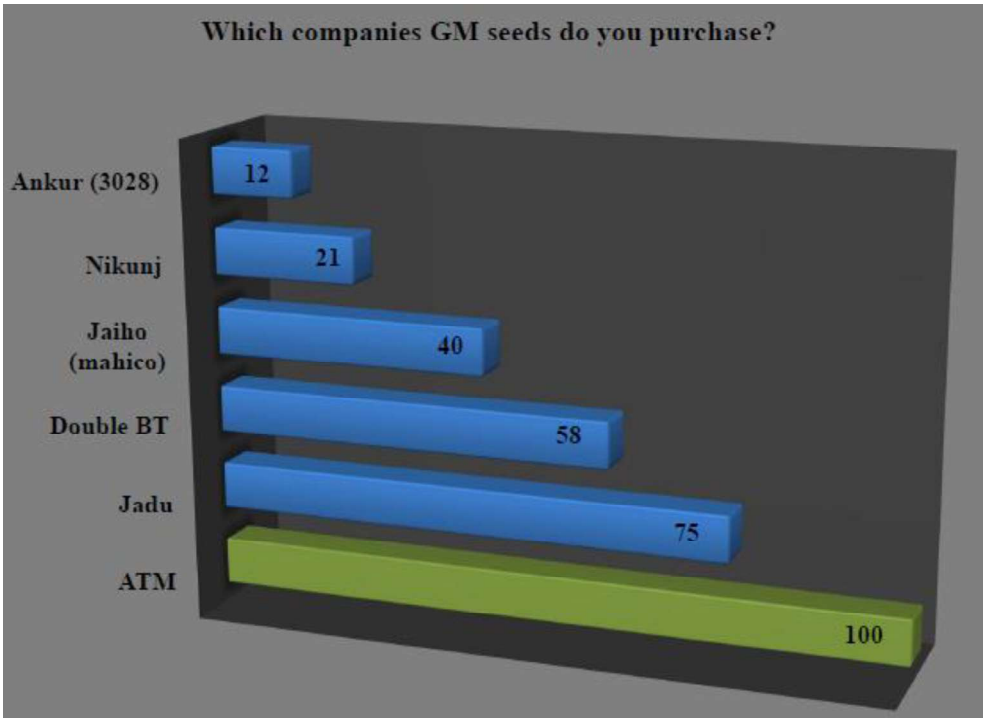
13. If you are using GM seeds, since when are you using it?



Inference: Only25 % of farmers have been using GM seeds More than 5 years while 75% farmers have started using GM Seeds in the last 5 years.

This shows that that more number of farmers is shifting towards GM Seeds since last 5years.

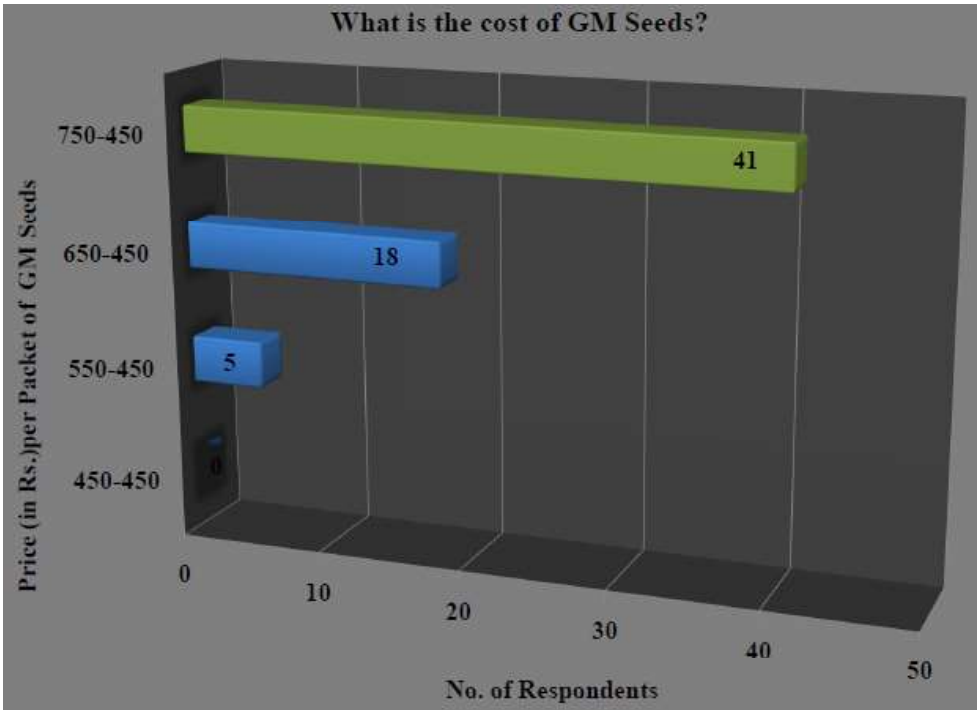
14. Which companies GM seeds do you purchase?



Inference: 100% farmers gave their first preference to the **ATM seeds**, whereas **Jadu** was given 75% preference, **Double Bt** and **Jai ho Mahico** were on third and fourth preference by 58% and 40% preference. Fifth and sixth preferences were given to **Nikung** with 21% preference and **Ankur (3028)** only 12% farmers gave the preference.

As the outcome of ATM seeds is more in GM crops and the chance of the crop failure is also comparatively low was told by all the farmers so they give first preference to this if they are planning to use or using the GM seed. Jadu 75 % gave the it as second preference by saying that they prefer it after ATM. Double Bt and Jai ho Mahico were as second last and last were Nikunj and Ankur (3028) were the last preference. The reasons of shifting from one brand to another might be various reasons like crop failure, cheap price of seed, and more number of farmers using the same seed and to avoid contamination they also using the same.

15. What is the cost of GM Seeds?

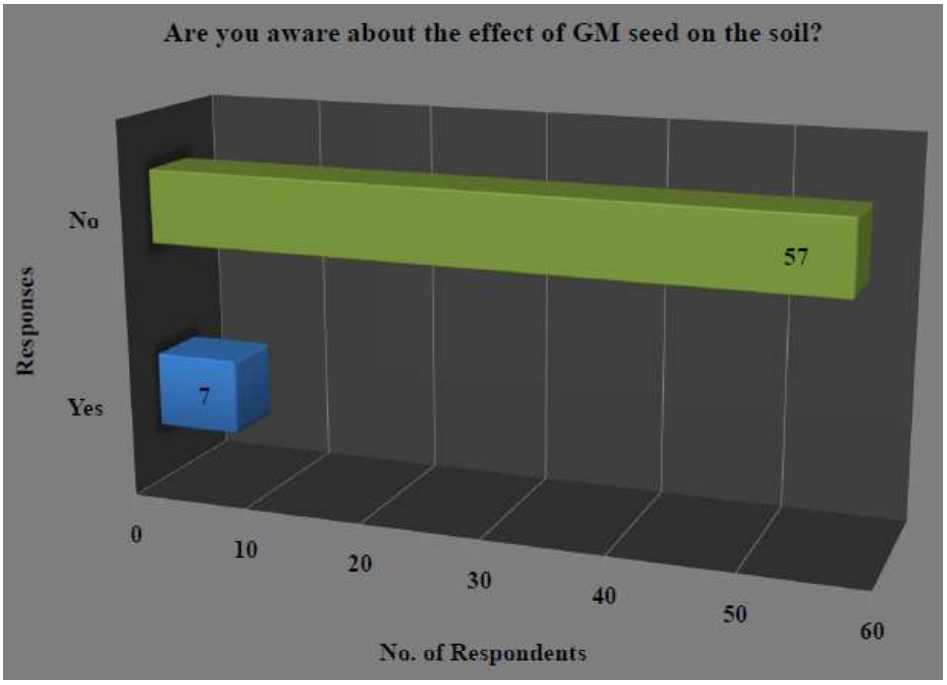


Inference: 64% of the farmers out of the 64 farmers use the GM Seed of Rs 750 per packet, where 28 % use Rs 650 packet and 8% farmers Rs 550 packet and 0% farmers use Rs 450 packet.

The Researcher asked the cost of GM seeds purchased by the farmers using it. Further as this was the open-ended question and varied numbers of prices were received so the researcher has divided prices into four set as Rs 450, Rs 550, Rs 650 and Rs 750 and the quantity of the packet taken was 450 grams. The price fluctuation is due to the varied numbers of seeds available in the market and also the availability of the same. Out of the 64 GM Seeds using farmers, 41 farmers purchase the Rs 750 priced packet. Whereas, Rs 650 packet is purchased by the 18 farmers and Rs 550 packet is purchased by five farmers but no farmer out of the 64 farmer prefers the Rs 450 price packet.

6.8.2.4 EFFECT ON SOIL

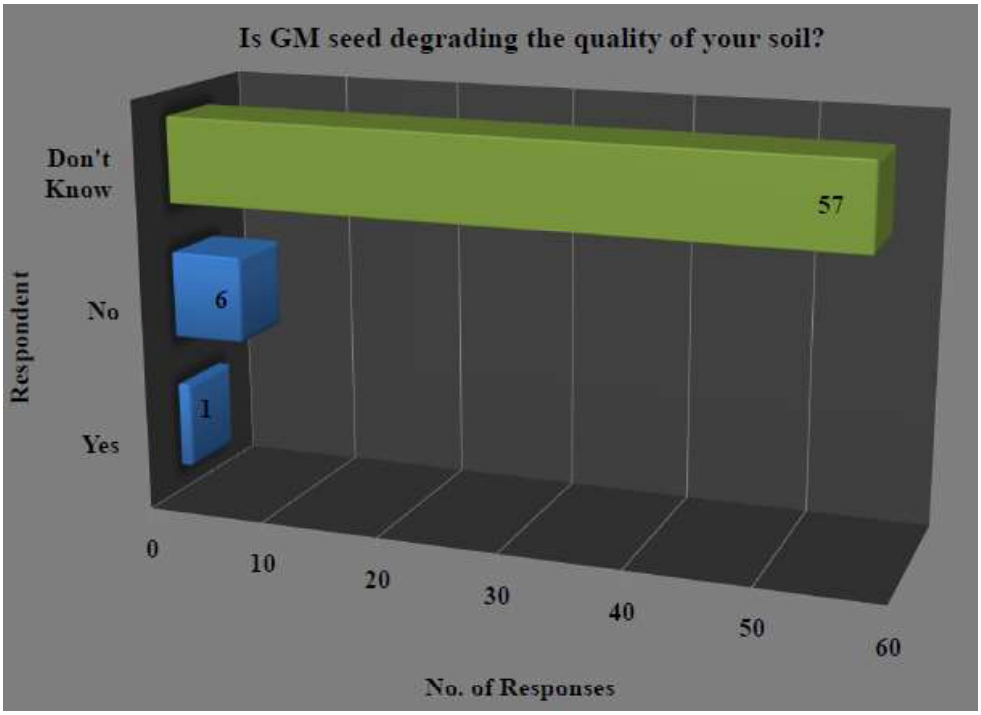
16. Are you aware about the effect of GM seed on the soil?



Inference: Out of the respondents using Gm seeds 89% said that they are not aware about the effect of GM seed on land on the other side 11% are well versed about the effect.

Out of the 100 farmers only 64 farmers use the GM seeds and from those 64 farmers only 7 farmers aware of the effect of GM seed on soil. On the other side majority of the farmers are not aware of the effect of the GM seeds on their land i.e. around 89% out of 64 farmers are not aware about the effect of soil.

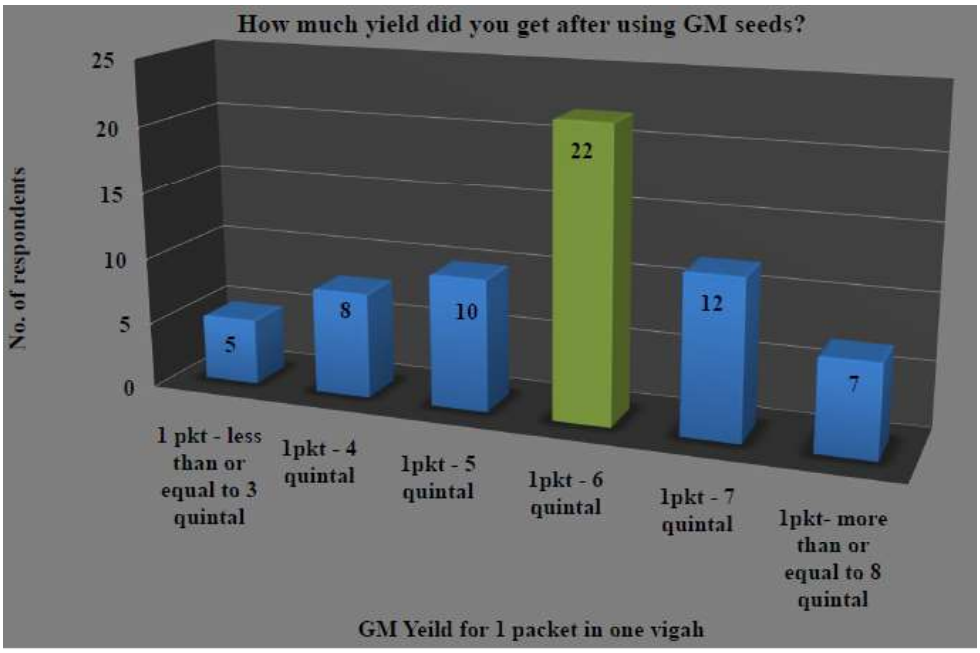
17. Is GM seed degrading the quality of your soil?



Inference: 89% of the farmers replied they don't know whether GM Seed degrading the quality of their soil or not, 9% of the farmers denied the degradation of their soil and only 2% of the farmers agrees about degrading the quality of their soil.

6.8.2.5 YIELDS

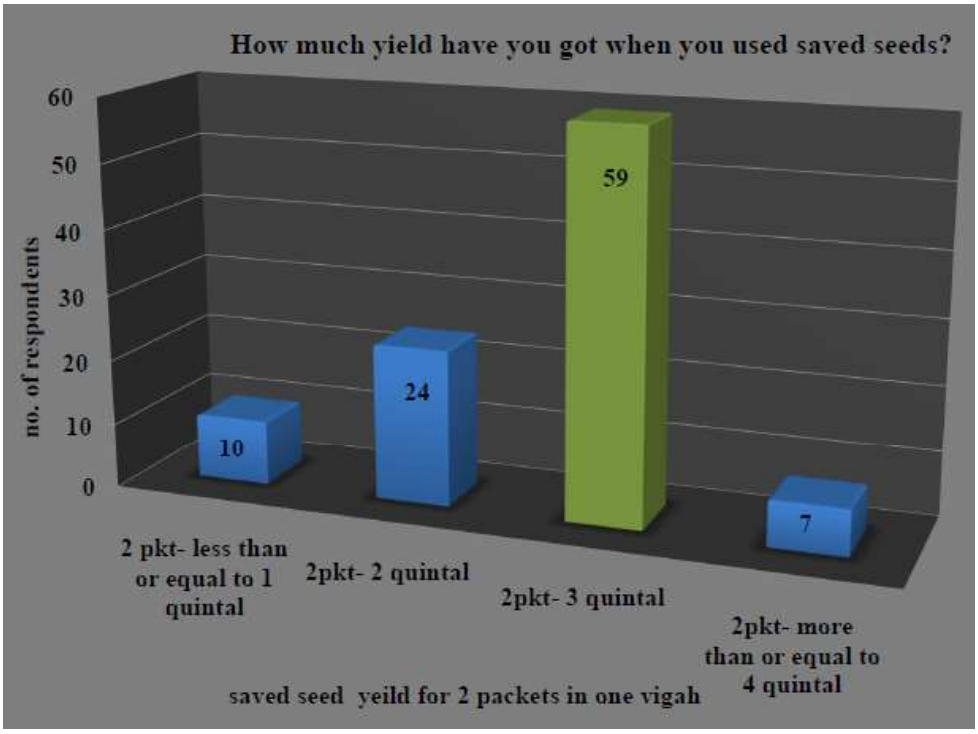
18. How much yield did you get after using GM seeds?



Inference: 34%of farmers out of 64 farmers get upto Six quintal yield on one Vigah from one packet of seeds, 18 % of farmers got seven quintal yield, 15% farmers got around 8quintal yield, 12% got five quintal of yield, 10% have got 4 quintal and 7% of farmers got three quintals of yield per Vigah using one packet of GM Seeds.

The researcher has asked the question of how much yield was generated per Vigah while using of one packet of GM Seed. And there were number of answers received from which the researcher has divided them into six categories. Where seven farmers out of the 64 farmers using GM seeds generated equal or more than eight quintal of yield using one GM Seed packet. 12 farmers got seven quintal of yield, 22 farmers were the highest yield generator who got six quintal per Vigah. 10 farmers got five quintal, 8 farmers got four quintal whereas, only 5 farmers got less than or equal to three quintal.

19. How much yield have you got when you used saved seeds?

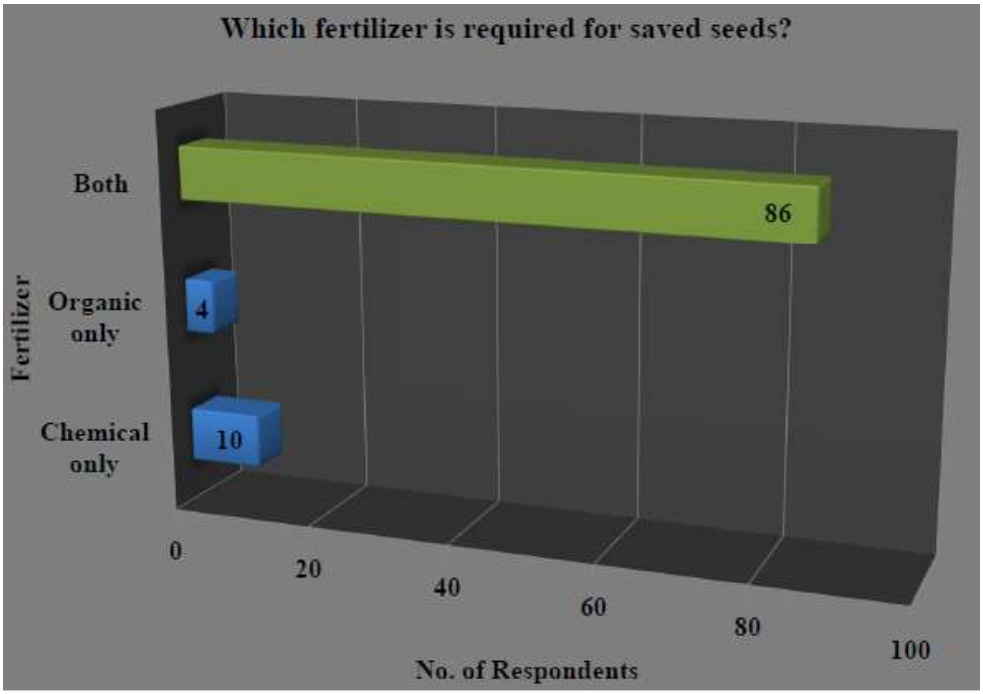


Inference: 59 % farmers out of 100 farmers said three quintal yield is by 2 packets of i.e. approx. 1kg, 24% said two quintal yield is generated , 10% said less than one quintal generate and 7% said more than four quintal.

The researcher has asked the question of how much yield was generated per Vigah while using of one packet of Saved Seeds. And there were number of answers received from which the researcher has divided them into four categories. Where 68 farmers out of the 100 farmers using Saved seeds said three quintal production was generated. 23 farmers said two quintal yield I generated, 10 farmers said than less than one quintal and 7 farmers said more than four quintal yield is there as the saved seeds give less yield but are organic in nature.

6.8.2.6 FERTILIZERS

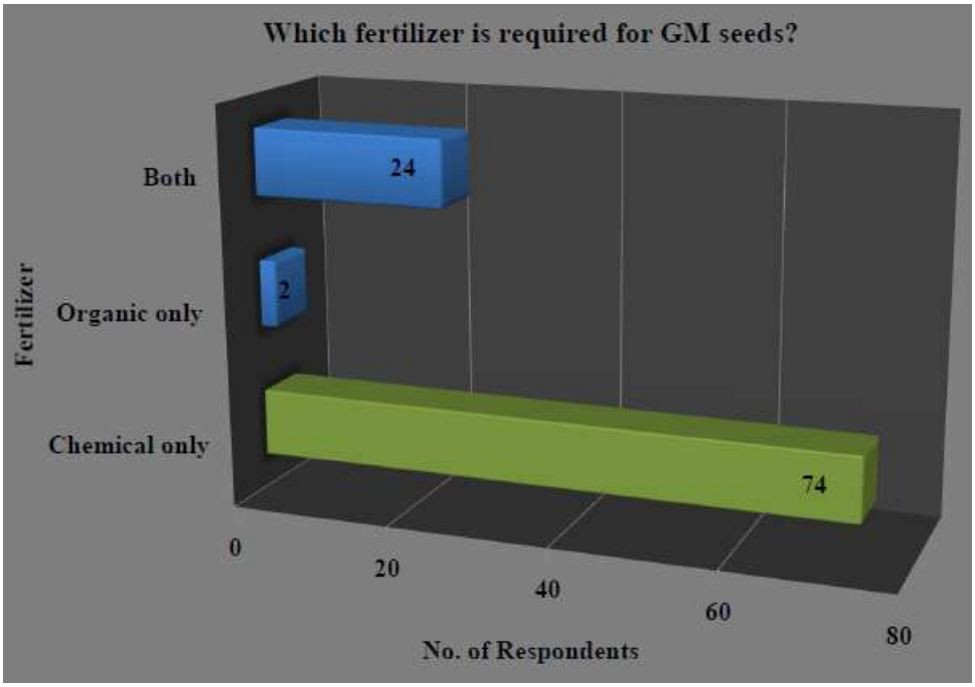
20. Which fertilizer is required for saved seeds?



Inference: 86% farmers use both fertilizers whereas 10% use chemical fertilizer on saved seeds and only 4 % use organic fertilizer.

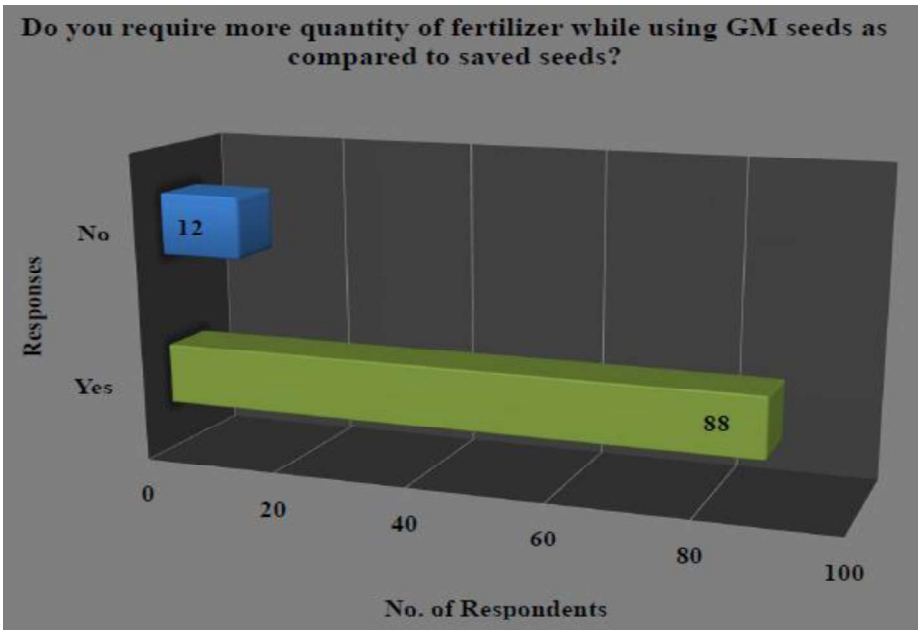
Out of the 100 farmers, majority 86% prefers both the types of the fertilizers for the saved seeds. Whereas, only 4% farmers prefer organic fertilizer for the saved seeds to develop organic farming. On the other side 10% use chemical fertilizer for the saved seeds to avoid failure of crops.

21. Which fertilizer is required for GM seeds?



Inference: 74% prefer chemical fertilizer on GM seed. Whereas, 24% prefer both types of fertilizer and only 2% prefer organic fertilizer on the GM seeds.

22. Do you require more quantity of fertilizer while using GM seeds as compared to saved seeds?

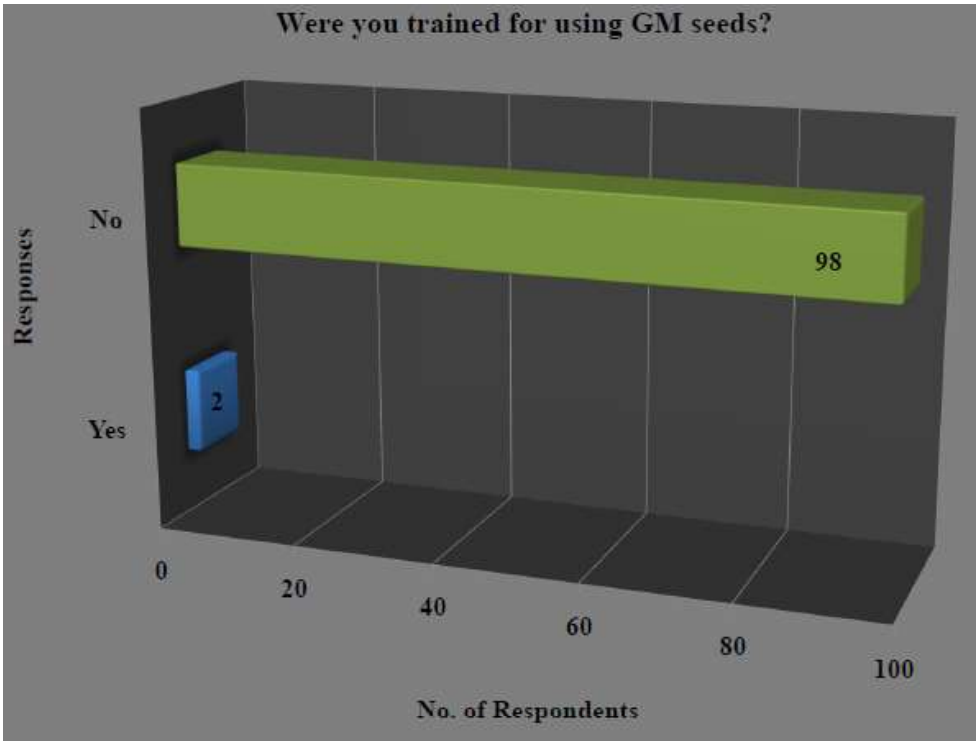


Inference: 88% farmers said Yes for more fertilizer needed in GM seed. Whereas, 12% said No.

Respondents were asked the question that, Do they require more quantity of fertilizer while using GM seeds as compared to saved seeds. 88% farmers said yes that the more amount of fertilizer is needed for the GM seed for getting more amount of yield. Whereas, 12% believed that Saved seeds need more amount of fertilizers for getting required amount of the yield.

6.8.2.7 TRAINING

23. Were you trained for using GM seeds?



Inference: 98% farmers said No for any training but 2% said yes.

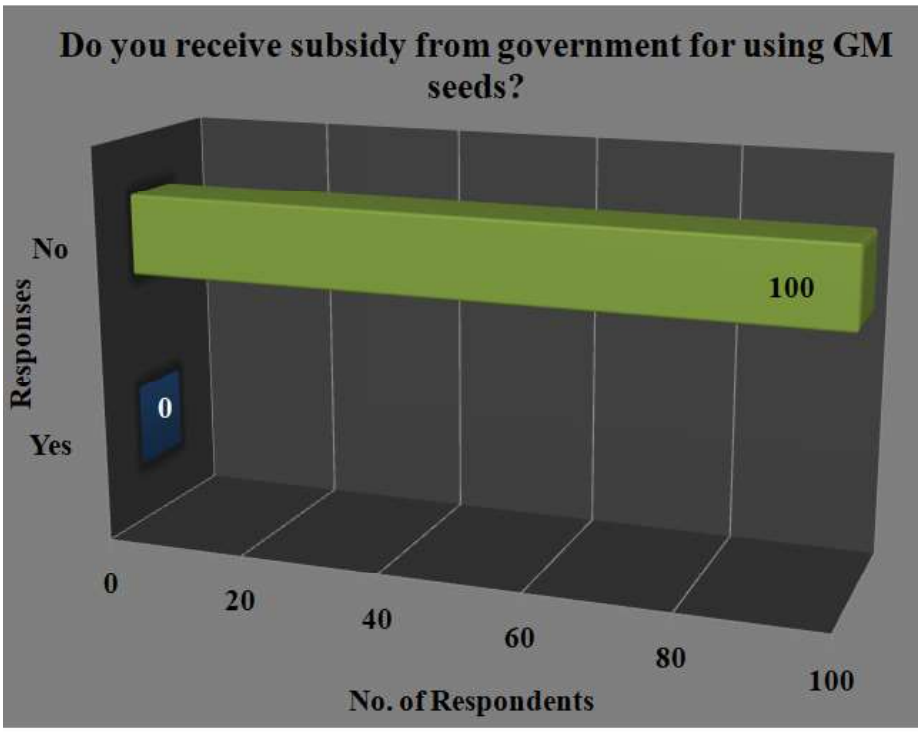
The Researcher asked any type of training received by the farmers during the purchase of the GM seeds. Out of the all 100 respondents 98 farmers said they have not got any training while purchasing of the seeds, nor they have heard about any training being given. Even the farmers who use saved seeds said they have not heard about any type of training given to other GM using farmers. But two farmers said yes that they have received a kind of training as how to sow the GM seeds foe more production and to avoid the pest.

24. If yes, has that training helped you for better production?

Here the researcher has asked in continuation of the previous question. Two farmers said that they had received the training and it had helped them for the better production.

6.8.2.8 SUBSIDY

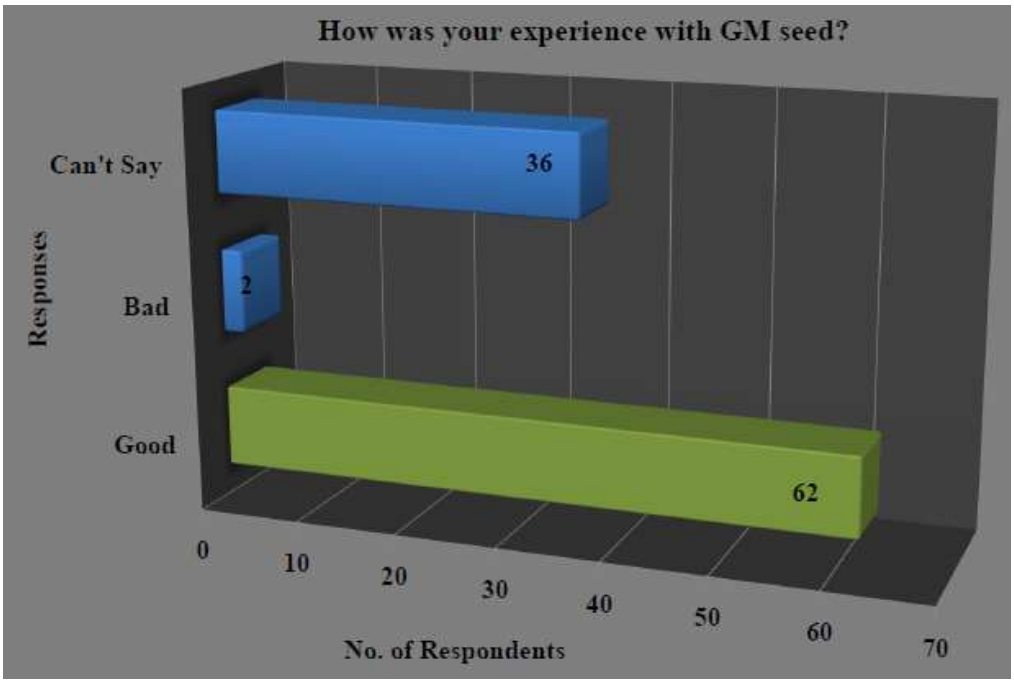
25. Do you receive subsidy from government for using GM seeds?



Inference: None of them received subsidy for the GM seeds.

6.8.2.9 EXPERIENCE WITH GM SEED

26. How was your experience with GM seed?



Inference: 62% out of total 100 farmers said the experience with GM Seed is Good whereas, only 2% said it to be Bad whereas 36% out of 100 farmers cannot say about their experience with GM seed.

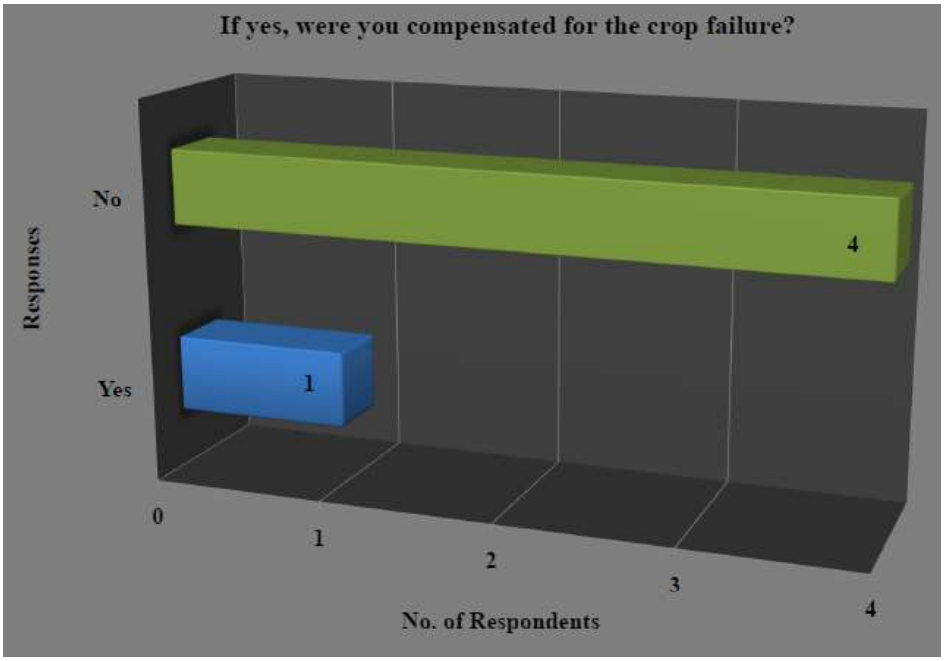
In this question the researcher asked about the experience of using the GM seeds where 64 farmers were happy with the experience of using it. Two farmers responded they are not happy or had the bad experience using GM seeds. Moreover, a large group of farmers did not answer to the question on experiences.

27. Have you experienced crop failure because of the use of GM seeds?

Inference: 7.81% said yes about crop failure and No 1.56% out of the 64 farmers using GM seeds, whereas 90.63% can't say.

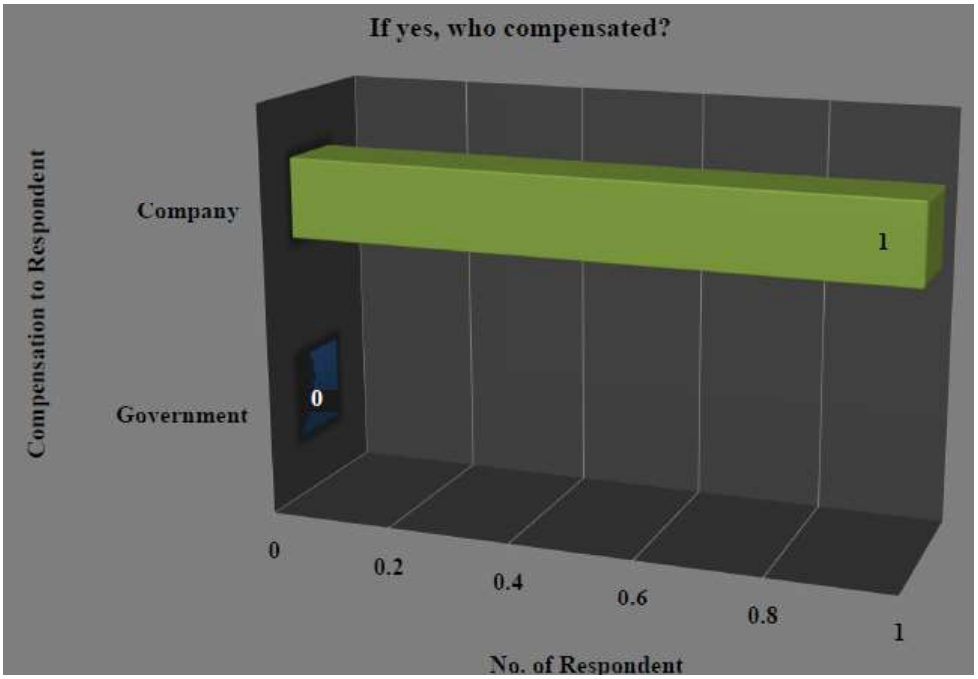
Here the researcher wanted to know about the crop failure because of use of GM seed only 5 farmers out of the 64 GM seeds using farmers have experienced the crop failure. For which they have held GM Seeds being responsible. Whereas only one farmer said he has experienced the crop failure but the reason was not the GM Seed. Other 58 farmers have not gone through major crop failure but the low production was the reason given by some.

28. If yes, were you compensated for the crop failure?



Inference: 80%said No as the answer. 4 farmers out of 5 i.e. 80% who had GM crop failure had not received any compensation.

29. If yes, who compensated?



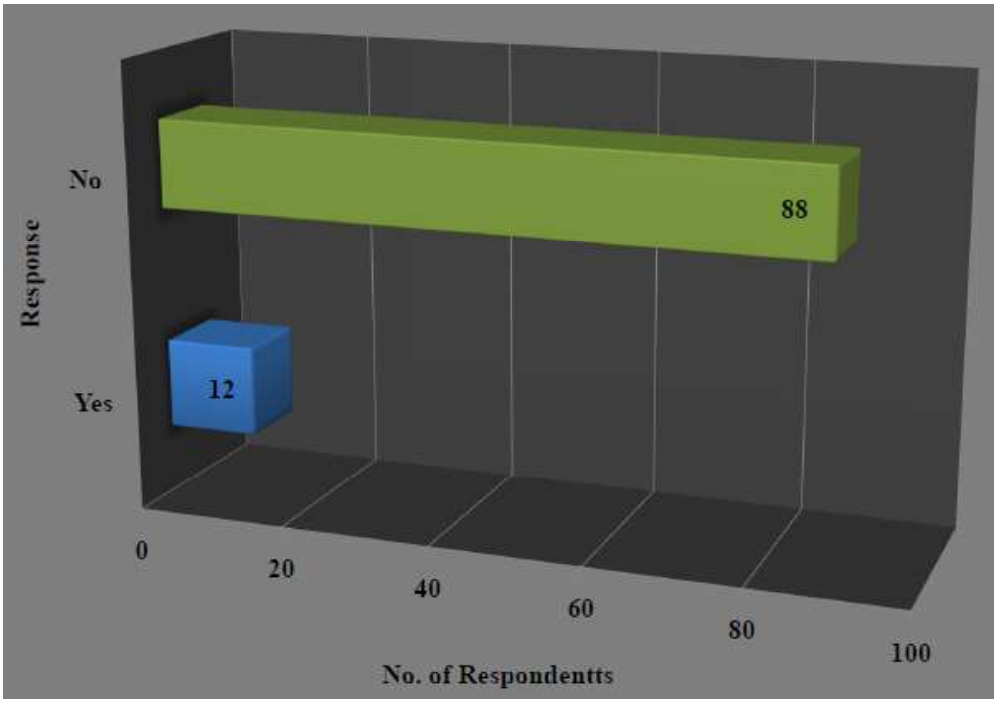
Inference: The only one farmer out of the five i.e. who had crop failure was compensated by the company.

30. How much compensation is given?

Only one farmer out of the five farmers said that he has received the amount for the compensation from the company which was the total investment of his seeds.

6.8.2.10 OPINION

31. If the New Act comes it would you be compulsory for farmers to register their seed before selling it, as a farmer would you agree to it?

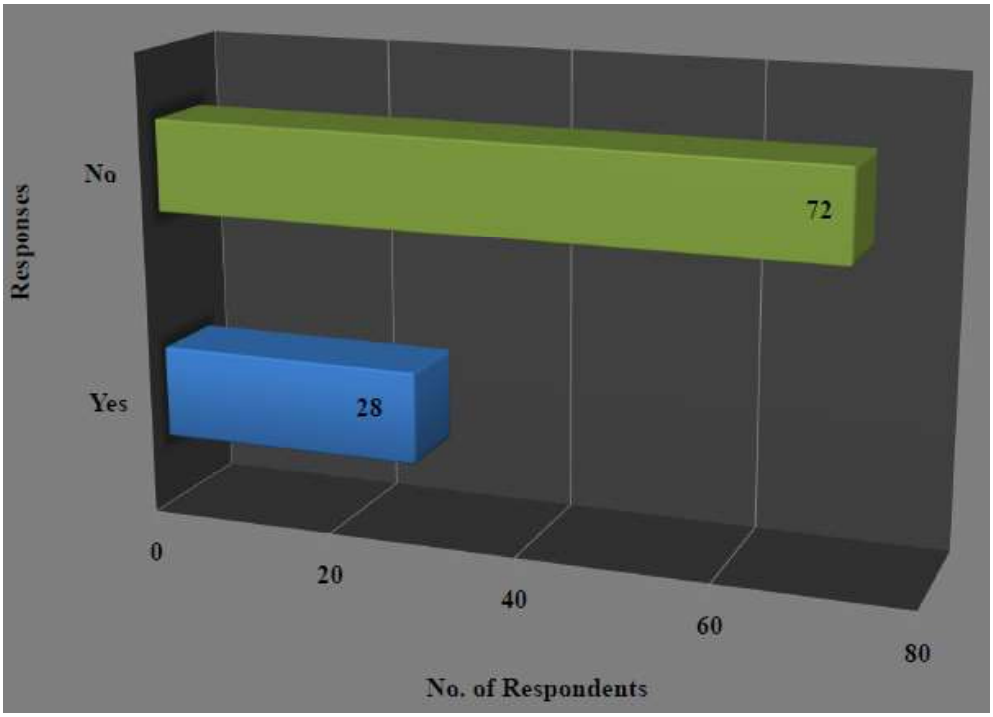


Inference: Maximum farmers rejected the preposition of compulsory registrations of seeds.

This question was opposed as a close-ended question by the researcher to the respondent farmers about their opinion about the compulsory registration of seed before selling it in the market. Answer to the question 88 farmers straight away said No about registration being made compulsory. As they were of the opinion that that would be the lengthier procedure and they didn't possess any expertise into it. Only a small part of farmers 12% farmers were ready for registration of seeds.

They were of the opinion this can help the farmer for claiming the loss but this mechanism will work only if fault seed laws being also made strict.

32. If government makes the use of GM seed compulsory and completely bans the use of saved seeds, is it good idea?



Inference: 72% farmers said No and 28 % farmers said Yes. Majority of farmers rejected this preposition.

This question was the close-ended question asked by the researcher to all the 100 farmers for which 72 farmers said No that only availability of the GM seed in the market can kill the traditional seed bank in the coming years and the seed would only remain as the commodity in the hands on the giant companies. Whereas, 28% said Yes for the availability of GM seed only in the market. Mostly, the ones who said yes from the younger age group.

After the data analysis and data interpretation in this chapter, the researcher in the next chapter which is the concluding chapter of this research work, tried to draw conclusions from the inferences gathered from the previous chapters. The researcher also tried to give suggestions in the next chapter.