

Pesticide usage by Grape Farmers in Maharashtra- Issues and Challenges

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Abstract

Agriculture sector is one of the significant zone in the world which is satisfying the basic need of food of human beings on the earth. Many agrarian nations are contributing in agriculture directly and indirectly and supporting each other. Indian Grapes are one of the popular fruit in the international market and Sangli District in the state of Maharashtra has more contribution in the production of grapes. Due to climate change, dynamic market demand at the international market, optimum profit ratio from limited plants of grapes, etc , sue of pesticide is one of the crucial stages in cultivation of grapes farms. For quality, quantity, colour, weight, etc. positive sides of grapes, use of organic and non-organic pesticides are must for the grape farming. However, use of pesticide should not affect the health of the person who is working on the ground level. Awareness of use of pesticide is need of time for rational utilisation of pesticides as well as the health of the farmers who are actually into use of pesticide in the grapes farm. Just and rational use of pesticide will surely maintain the balance of atmosphere on the earth as well as the health of grapes farmers.

1. Introduction

1.1 Position of grape marketing in the world with special reference to Sangli's Grapes

1.2 Grape production and use of pesticides

2 Literature Review

2. Objectives and Data sources and Research Methodology

3. Discussion and Findings

4. Legal Provisions -usage of pesticide in Sangli, Maharashtra

5. Conclusion and recommendations

Appendix- Analysis of imperial data relating to use of pesticides

I) INTRODUCTION

In Indian economy, agriculture sector is a backbone of nation India is one of the agricultural nations. The share of agriculture in GDP increased to 19.9 per cent in 2020-21 from 17.8 per cent in 2019-20¹. It has great contribution in nourishing local need of food as well as exports to needy nations outside India by way of export. It has a sacrosanct glory of production of many

¹<https://www.downtoearth.org.in/news/agriculture/agri-share-in-gdp-hit-20-after-17-years-economic-survey-75271#:~:text=The%20share%20of%20agriculture%20in%20GDP%20increased%20to%2019.9%20per%20cent%20was%20in%202003%2004.&text=The%20government%20allocated%20943.53%20lakh,Union%20territories%20till%20December%202020.>

grains, vegetables, fruits, floors, etc. It includes traditional mode of farming as well as innovative mode of farming as per changing scenario to cope with the time. Grape Production is one of the benchmark in food industry in India. In order to produce grapes in scientific and professional manner, various agricultural departments and research centers of the Central and the state government working rigorously. Agricultural colleges, training institutions are also playing dynamic role.²

The Indian Council of Agricultural Research (ICAR) under Ministry of Agriculture and Farmers Welfare plays a central role at the national level and it aids, promotes and coordinates research and education activities throughout the country. The Agriculture Sector comes within the ambit of the State list of Seventh Schedule of Indian Constitution,³ thereby authorizing the respective State Governments to enact any law or policy relating to agriculture sector in India. Further there are certain central laws that overlook and play a supervising role on the State laws pertaining to agricultural produce including Insecticides Act, 1968⁴, Insecticides Rules, 1971⁵, Plant Quarantine order etc.

However, with the passage of time, overall scene of the agricultural sector got new shape due to innovative practices in the agriculture sector, globalization, demand for new vegetable, fruit, flowers, etc. from the market. Green revolution in mass production of agricultural sector brought miracles. Agricultural sector is now not limited for production of specific kind of crops or vegetables which satisfies the needs of farmers and town but also to export the same and make money out of that. In order to be fit in market and for quick results, farmers indirectly involved in using technology.

Therefore, the Agricultural sector is badly affected by use of mass chemicals on the plants for the desired outcomes. Irrespective of the far reaching risky consequences, farmers are blindly using high chemicals on the plants. Optimum utilization of resources by use of science is good thing. However that should not happen at the cost of life of people and millions of species on the earth. Nobody has given liesence to play with the earth life cycle. For fast growth of plants, crop protection, food and material preservation, etc. use of pesticide has become routine for most of the farmers.

An important activity of the United Nations Food and Agriculture Organization (FAO) is to assist Member States to ensure that, as far as possible, pesticides are used effectively and safely.⁶

² Anwesha Borthakur* and Pardeep Singh, History of agricultural research in India, Genral Articles, Current Science , Vol. 5, Sept. 2013 Source- <file:///C:/Users/Nikhil/Downloads/0587.pdf>

³ Entry 14, List II of the Seventh Schedule of Indian Constitution – Source- <http://www.mea.gov.in/Images/pdf1/S7.pdf>

⁴ The Insecticides Act, 1968.

⁵ The Insecticides Rules, 1971.

⁶ *Proceeding of a final research coordination meeting*, organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and held in Hangzhou, Zhejiang, China, 24–28 May 1999, Impact of

Grapes and Pesticide Sprays

Pesticide is one of the external medicines given to the plant by roots or sprayed on the plant by use of machinery. Pesticides are an integral part of modern life used to prevent growth of unwanted living organisms⁷. Pesticides are substances or mixtures of substances that are mainly used in agriculture or in public health protection programs in order to protect plants from pests, weeds or diseases. It has different form. It can be fungicide, insecticide, herbicide, rodenticides, etc. It has directly and indirectly connected with health of human beings, cattle, animal and environmental issues. The government is also careful to give permission of production and use of some pesticides and to ban use of pesticides through its specific statutes and policies.

India has very lavish history of agricultural production. There are references of use of pesticides during Rig Veda Period to protect crops from worms and pests. Since before 2000 BC, humans have utilized pesticides to protect their crops. The first known pesticide was elemental sulfur dusting used in ancient Sumer about 4,500 years ago in ancient Mesopotamia. The Rig Veda, which is about 4,000 years old, mentions the use of poisonous plants for pest control.⁸ Green Revolution has triggered the importance of mass production of food all over India. Basically originated during 1943 to 1970 in Mexico. It has accelerated industrialization in agriculture sector. Many developing nations have witnessed this drastic change. The initiatives involved the development of high-yielding cereal grains, expansion of irrigation infrastructure, and distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers⁹. Better and fast management, quick result oriented techniques, etc. are dimensions of such farming. In addition to self-satisfaction of food demand, it also exports to different nations based on their demand. Industrialization or corporate style is increasing in agricultural sector¹⁰. Earlier, only limited scope of production farmers had. It barred farmers to grow multiple crops. However, with changing demand and liberalization policies, the face of agriculture sector is changing. Grains, Vegetable, Fruits, Flowers, etc. are produced in bulky manner. So, for such a kind of massive production, there is a dire need of use of pesticides and fertilizers. For faster results, use of different pesticide is necessary.

long term pesticide usage on soil properties using radiotracer techniques Source- https://www-pub.iaea.org/MTCD/publications/PDF/te_1248_prn.pdf

⁷ Ivan Masymiv, Pesticides : Benefits and Hazards, Journal of Vasyl Stefanyk Precarpathian National University, Vol. 2, No. 1 (2015), 70-76 Source- [file:///C:/Users/Nikhil/Downloads/PESTICIDES_BENEFITS_AND_HAZARDS%20\(1\).pdf](file:///C:/Users/Nikhil/Downloads/PESTICIDES_BENEFITS_AND_HAZARDS%20(1).pdf)

⁸ Dr. Ishan Pandya, Pesticides and Their Applications in Agriculture, Asian Journal of Applied Science and Technology (AGAST) (Open Access Quarterly International Journal) Volume 2, Issue 2, Pages 894-900, April-June 2018, Source -<file:///C:/Users/Nikhil/Downloads/5023.pdf> Date of Visit- 6th April 2020

⁹ Ayesha Ameen and Shahid Raza, Green Revolution- A Review , International Journal of Advanced Scientific Research, 2017 (3), 12 ISSN: 2395-3616 (Online) Journal DOI: <https://doi.org/10.7439/ijasr> Review Article Green

¹⁰ Polyxeni Nicolopoulou-Stamati,^{1,*} Sotirios Maipas,¹ Chrysanthi Kotampasi,¹ Panagiotis Stamatis,¹ and Luc Hens² ,Chemical Pesticides and Human Health: The Urgent Need for a New Concept in Agriculture, Frontier in public health, 2016

India is one of the pioneer pesticide producers in the world. It has various multinational corporations dealing with this as well as it has 125 producers of large and medium scale industries. India is one out of first top ten agrochemical industries in the world. It has 4th biggest production in the world ranking after America. In order to regulate its mechanism first time in year 1968, the Insecticide Act was enacted. Basically it has enacted to regulate registration process, import and export mechanism, manufacturing process, marketing, transportation, distribution, etc. of pesticides in India. Formal Registration mechanism is also created. First time in the history of India, registration made mandatory for any business relating to pesticides. These laws have definitions and penal provisions. Registration procedure, List of banned pesticides, etc. provisions are also mentioned. In addition to this statute, in year 2008 The Pesticide Management Bill is enacted for more transparency and accuracy in the statute¹¹. The pesticides' regulations in India are governed by two different bodies: the Central Insecticides Board and Registration Committee (CIBRC) and the Food Safety and Standards Authority of India (FSSAI)¹². Classification of Pesticides- It can be classified under following manner.¹³

- a) Classification based on Mode of Entry
- b) Classification based on the Pesticide Function and Pest Organism they Kill
- c) Classification based on Chemical Composition of Pesticides
- d) Based on toxicity of pesticides

In addition to this, it can be based on mode of action, source of origin, range of target to kill, and finally on the basis of type of formulation. Formulation can be subdivided in to liquid, powder, granules, bates, dust , ultra-low volume liquid,

In order to get the best and quality product, one has to protect plants and fruits from pests and insects. Hence spray of pesticide is one of the regular task of grape producers in Sangli District. Grapes plant has different stages to undergrown starting from planting nursery till reaping fruits. Those times lines needs to be followed meticulously to protect plant from pests and insects. Better and fast management, quick result-oriented techniques, etc. are dimensions of such farming. In addition to self-satisfaction of food demand, it also exports to different nations based on their demand. Industrialization or corporate style is increasing in agricultural sector.¹⁴

¹¹ Pesticides, Law Registration and FDI in India, India Juris, International Law Firm, <http://www.indiajuris.com/uploads/publications/pdf/a1396263324opesticide.pdf> date of visit 5th April 2020

¹² <https://www.cseindia.org/state-of-pesticide-regulations-in-india-7611>

¹³ Ishwarchandra Yadav and Ningombam Ninthoingambi Devi, Pesticide Classification and its impact on Human and Environment, Environment Science and Engineering , Vol. 6, Toxicology Source- https://www.researchgate.net/publication/313445102_Pesticides_Classification_and_Its_Impact_on_Human_and_Environment

¹⁴ Polyxeni Nicolopoulou-Stamati,^{1,*} Sotirios Maipas,¹ Chrysanthi Kotampasi,¹ Panagiotis Stamatis,¹ and Luc Hens², Chemical Pesticides and Human Health: The Urgent Need for a New Concept in Agriculture, Frontier in public health, 2016

Pesticides are used for the following purposes

- a) To enhance imunation capacity of plants
- b) Strengthen roots and to Improve food capturing capacity of roots
- c) Regular and effective flooring and to stop dropping out in flooring
- d) For gaining weight, shape, taste and quantity of fruit
- e) To strengthen plant before sudden climate change
- f) To prevent plan in the scarcity of water or fertilizers
- g) For moisture utilization
- h) To enhance photosystem

Modes of Spray

As per size of plots and sensitivity of pesticides, different modes of spray are followed.

- a) Hand Pump- Having capacity of 5 to 10 liter pesticide and can be operated manually by a single person. It is useful for a nursery stage when plants are too small. Capacity of Preserver can be 5 liter.
- b) Battery Operated Sprayer
- c) Machine or Power Pump- It is almost like hand pump but sprays are operated automatically with help of machines. Use of fuel is required. And a single person can operate this machine.
- d) STP Spray Pumps – Machine and the tank of pesticide can be kept at one place and by movement of spray pipes it can be operated by a single or two persons. It can cover maximum area for spray in less energy and time consumption
- e) Tractor Mounted Sprayers – Now a days to cover maximum area in less time and energy, tractor mounted sprayers are very commonly used in the Sangli District for spraying pesticides in grape farms. Sizes of such tractors are adjustable to the size available between two lines of grapes plants. Around 1000 liters of pesticide can be sprayed at a time.

Literature Review

- 1) **Debjit Ghosh and Chaitali Chakraborti, and Riya Dasgupta, A Survey of Indian Grapes at Sangli, Maharashtra , India, International Journal of Current Microbiology and Applied Sciences, Source- <https://www.ijcmas.com/6-5-2017/Debjit%20Ghosh,%20et%20al.pdf>**

This article has analyzed features of grapes and India's ranking in grape production all over the globe. Grape production material and its various methods, productivity criteria, quality assessment and weight management, etc. In quantitative analysis, it has covered different grape varieties, crop concentration index of different blocks in Sangli district, quality parameters for export quality grapes, etc.

Comment [S1]: The details about the paper in the references. Just author (year) and how they have worked in this field.

- 2) **Nikam Vinayak Ramesh, Premlata Singh, Shivkumar, K. Vijayaragvan, Determinants of success of Mahagrapes as perceived my members , International Journal of Extension Education, Vol No 10, Dec 2014- Source- https://www.researchgate.net/publication/279190215_Determinants_of_success_of_Mahagrapes_as_perceived_by_members/link/558d545e08ae97d8e423c1dc/download**

This article has covered how Mahagrape is successful in linking farmer community in Maharashtra to international level by way of exporting quality grapes. It is a product a surveys being conducted in specific areas famous of grapes specifically Nashik, Sangli, and Pune district in Maharashtra. On the basis of surveys, analysis of determinant factors about grape farming is mentioned. This article has analyzed how different factors like infrastructure, market, global competitiveness, assessment of quality services, income, standard of living, use of modern technology with the passage of time, assured income, and insurance.

- 3) **Dr. Ishan Pandya, Pesticides and Their Applications in Agriculture, Asian Journal of Applied Science and Technology (AGAST) (Open Access Quarterly International Journal) Volume 2, Issue 2, Pages 894-900, April-June 2018 , Source - <file:///C:/Users/Nikhil/Downloads/5023.pdf> Date of Visit- 6th April 2020**

This article elaborate historical development of use of pesticides in India. Various references are mentioned. Different types of pesticides and their sub categories are mentioned like fungicide, herbicide, Nemaaticides , insecticides, etc. It has covered scientific references of plants and pesticides in technical manner. It conclude with use of eco -friendly pesticide is a need of an hour.

- 4) **Svetlana Roljević Nikolić , Predrag Vuković , Biljana Grujić, MEASURES TO SUPPORT THE DEVELOPMENT OF ORGANIC FARMING IN THE EU AND SERBIA, Review Article, Economics of Agriculture 1/2017 UDC: 338.246.027:631.147(497.11)(4-672 EU)**

How organic farmingis preferred by European nations from last decade is mentioned. Along with this, it covers quantitative data relating to support system and different policies. It has analyzed space spent by European nation's member states for organic farming, number of organic producers. And organic market trend in Europe.

- 5) **Food and Agriculture Organization of the United Nations Rome, 1995, Guidelines for Good Labeling Practices for Pesticides, Source- http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/Old_guidelines/label.pdf**

It has elaborated in details the label contents, how to write a label, price, use, layout, purpose of pesticide, toxicity levels, etc. minute aspects of pesticide. It has also quantitative data of determination of WHO hazard classification. And finally it has recommended measures of flow chart of label contents verification.

6) WHO. Geneva: World Health Organization; 1990. Public Health Impact of Pesticides Used in Agriculure; p. 88.

This article evaluate the scope and severity of risks to human health caused by exposure to agricultural pesticides. It has covered correlation between use of pesticide and its adverse impact of human health. It has identified specific kinds of pesticides having serious hazards to human being and its consequences on the next generations.

7) Pesticides, Law Registration and FDI in India, India Juris, International Law Firm, <http://www.indiajuris.com/uploads/publications/pdf/a1396263324opesticide.pdf> date of visit 5th April 2020

This article has comprehensive outline of pesticide legislation in India. It has covered important provisions under the Pesticide Act, 1968. Afterword's, how the Pesticide Rules 1971 came in to existence to fill up lacunae under the existing legislation. This article has also covered different causes of use of pesticides for different reasons by the farmers. An attempt in year 2008 to bring amendments under the Act is also highlighted in this article.

8) The Pesticide Management Bill, 2020, Approved by the Union Cabinet dated 12th February, 2020. <https://www.cseindia.org/state-of-pesticide-regulations-in-india-7611>

This bill has specific provisions to uplift an interest of farmers, it has provision about bringing farmers as a consumer under the Consumer Protection Act, State to promote awareness, to find out alternate modes apart from use of chemical pesticides to protect human beings, animal and environment, and lastly is has recommended strict punishments which is heavily imposing imprisonment and fine on law breakers.

9) Ayesha Ameen and Shahid Raza, Green Revolution- A Review , International Journal of Advanced Scientific Research, 2017 (3), 12 ISSN: 2395-3616 (Online) Journal DOI: <https://doi.org/10.7439/ijasr> Review Article Green

This article has enlightened the historical development of green revolution. It has covered need of green revolution, its scientific techniques, hybridization, food security, quality of diet, impact on globalization and biodiversity, health and different deseases which are coming up due to use of pesticides.

Scope and Limitations- This article has analyzed awareness about use of pesticides in Sangli District with special reference to grape production. This paper has not covered any other area apart from Sangli due to positivity of time and other resources

Significance of the research- This paper is useful for the students, faculty members, agricultural universities and training centers, policy makers and ultimately the farmers.

Objectives –

- a) To **examine** the significance of pesticides for grapes in Sangli district farmers
- b) To **study** care and protection while spraying pesticide before and after spray on grapes

- c) To **recommend** solutions for better care and protection relating to use and application of pesticide sprays on grape farms in Sangli.

Research Methodology –

Doctrinal research methodology is used in this research paper. Also, in order to validate the claims, non-doctrinal methodology is also used by way of conducting interviews of the stakeholders.

Data Source- This data is collected from books and literature.

II) POSITION OF SANGLIS GRAPES IN AGRICULTURE SECTOR

Sangli is one of the leading grape producers in India¹⁵. Grape comes under fruit category of agriculture and has its unique space in the agriculture era. In fruits market all over the world, grape has more demand. Indian grapes, specifically from the state of Maharashtra has demand. Specific areas in Maharashtra has unique identity of grape production due to special features of soil, water availability, climate and other compatible atmosphere. Tasgaon, Palus, Vita and Miraj Blocks in Sangli district are famous for grape production. Grapes are means of livelihood for many farmers, it is a means of employment generation, trade of grapes and bedana, manuka, etc. It has round shape and also oval shape. It can be green, faint green and black in colors. Sonaka, Thomsans, are its different types. Wine production is also one of the closer industry associated with grape farming. So, along with European nations, Indian grapes are also have its identity.

Sangli district is blessed with river Krishna, Warna, Koyna, which are lifeline of that green zone. Fertile land, Continuous water sources, clean and dry climate, connectivity with NH 4 (Asian Highway no) and Miraj Railway Junction (one of the major Raiway junctions in Western Maharashtra) on the border of Maharashtra and Karnataka, and agricultural education and training facilities in the local universities, grape farming is getting new respect in the agriculture. Various scheduled banks, cooperative finance societies are also keen to sponsor for grape farming. It requires skillful workers and that area has such workers for different work at different stages. Pure plants, sticks, focus and Y shapes iron angels for pandal are also easily available in the local market. There are irrigation schemes for optimum utilization of dry area as well¹⁶.

1) Debjit Ghosh and Chaitali Chakraborti, and Riya Dasgupta, A Survey of Indian Grapes at Sangli, Maharashtra, India, International Journal of Current Microbiology and Applied Sciences, Source- <https://www.ijcmas.com/6-5-2017/Debjit%20Ghosh,%20et%20al.pdf>

¹⁶ Shivling Rajmane, A Study of Irrigation Set up in Sangli District - Volume 6, Issue I, <http://ijrar.com/>

Not only in black soil, but also in stony , rockful, red or white soil as well grapes can be produced in that area.

III) LEGAL PROVISIONS RELATING TO USE OF PESTICIDES

In order to regulate its mechanism first time in year 1968, the Insecticide Act was enacted followed by the Insecticides Rules introduced in the year 1971¹⁷. It was enacted to regulate registration process, import and export mechanism, manufacturing process, marketing, transportation, distribution, etc. of pesticides in India. Formal Registration mechanism is also created. First time in the history of India, registration made mandatory for any business relating to pesticides. These laws have definitions and Penal provisions, Registration procedure, List of banned pesticides, etc. mandatory mechanisms are also mentioned. In addition to this statute, in year 2008 The Pesticide Management Bill is enacted for more transparency and accuracy in the statute¹⁸, followed by the Draft Pesticide Management Bill 2017, which inturn was followed by the **new Pesticide Management Bill** approved by the Union Cabinet on 20th Feburary, 2020¹⁹ which requires to fill in the existing gaps in the previous bills by suggesting certain changes including:

Comment [S2]: To be put after the findings and discussion

- Minimal use of pesticides.
- Preference to the voice of the State governments.
- Ban on Class-I Pesticides mandatorily.
- Ban of pesticides promotions.
- Need for farmers to be aware of their judicial usage.
- Need for alternatives in order to phase out the present chemical usage.
- Lastly, No application of pesticides without personal protective equipment and the principle of “Acute emergencies” and “Polluter Pays Principle” should apply.

The pesticides’ regulations in India are governed by two different bodies: The Central Insecticides Board and Registratation Committee (CIBRC) and the Food Safety and Standards Authority of India (FSSAI)²⁰.

Classification of Pesticides- It can be classified under following manner.²¹

- e) Classification based on Mode of Entry
- f) Classification based on the Pesticide Function and Pest Organism they Kill
- g) Classification based on Chemical Composition of Pesticides

¹⁷ The Insecticides Rules, 1971.

¹⁸Pesticides, Law Registration and FDI in India, India Juris, International Law Firm, <http://www.indiajuris.com/uploads/publications/pdf/a1396263324opesticide.pdf> date of visit 5th April 2020

¹⁹ The Pesticide Management Bill, 2020, Approved by the Union Cabinet dated 12th February, 2020.

²⁰ <https://www.cseindia.org/state-of-pesticide-regulations-in-india-7611>

²¹ Ishwarchandra Yadav and Ningombam Ninthoingambi Devi, Pesticide Classification and its impact on Human and Environment, Environment Science and Engineering , Vol. 6, Toxicology Source-https://www.researchgate.net/publication/313445102_Pesticides_Classification_and_Its_Impact_on_Human_and_Environment

h) Based on toxicity of pesticides

In addition to this, it can be based on mode of action, source of origin, range of target to kill, and finally on the basis of type of formulation. Formulation can be subdivided in to liquid, powder, granules, bates, dust, ultra-low volume liquid etc.

It is bitter truth that use of pesticide has side effects. Glass, plastic or metal flasks, bottles, drums, traps, plastic bags or paper bags, etc. are the containers of such pesticides.²² Hence, the manufacturing companies of pesticides follow the norms of precautionary measures. By way of instructions on labels and palpates information is given. Generally it covers the following information

Section 2 of the Pesticide Act, 1968 defines label as "label" means any written, printed or graphic matter on the immediate package and on every other covering in which the package is placed or packed and includes any written, printed or graphics matter accompanying the insecticides²³;

- a) Name of Pesticide and its manufacturing company
- b) Its trademark (in case it has)
- c) The crops or fruits for which it can be used with or without pictures
- d) Ingredients of pesticides with quantity
- e) Possible effect of this pesticide
- f) Instructions for use
- g) Date of manufacturing and expiry date.
- h) Batch number
- i) Detailed address of manufacturer , the location details of field as well as corporate office
- j) Websites of company
- k) Consumer care number and email id
- l) Precautionary measures in case of any side effects

To put all those information is one of the mandates under the Pesticide Rules 1974

IV) CONCLUSION AND RECCOMENDATIONS

Grape production in Sangli district has its unique contribution in the local economy. Use of pesticides is indispensable for grape production. India is one of the top ten nations in the world using pesticides.²⁴ Poisoning with pesticides is frequent in India and carries a high mortality and

²²<http://www.who.int/ceh/capacity/Pesticides.pdf>

²³Section 2 of the Pesticide Act, 1968

²⁴ Dr. Ishan Pandya, Pesticides and Their Applications in Agriculture, Asian Journal of Applied Science and Technology (AGAST) (Open Access Quarterly International Journal) Volume 2, Issue 2, Pages 894-900, April-June 2018 , Source -<file:///C:/Users/Nikhil/Downloads/5023.pdf> Date of Visit- 6th April 2020

morbidity²⁵. This is alarming situation. On one hand, pesticides are useful and result oriented for the farmers. If farmers are happy, all nations will be happier. But it should not be at the cost of public safety and environmental degradation.

Residue free farm product is not a distance dream. Collective efforts of policy makers, Ministry of Agriculture, Farmers and Ministry of Economics and Commerce can prevent further harm to environment. Regulation and prohibition of use of certain pesticides are already enacted by the government in year 2008. There are provisions for registration and manufacture of pesticides and insecticide. Most of the chemical companies put user manuals on those chemicals. However, there is no inspection mechanism to verify the *modus opperendi* of the persons using that product. Therefore, there is a dire need to inspect the use of such chemicals and find better substitute which is harmless to human being and biodiversity.

Agriculture research in this area is gray area. So, all the agriculture departments under ministry along with agricultural universities should conduct research for better future of poison free food sector.

RECOMMENDATIONS

i) **Good Labeling practices with user friendly language on pesticide packages of grapes.**

It should be in local languages and in a simple language which can be understandable by all the persons handling pesticides. It should have hazardous symbols.²⁶ The contents and form of information needs to be reader friendly and in the local languages. Most of the pesticide companies hardly use local languages that can be barrier in understanding and this is one of the communication barriers between production industry and ultimate user. The font of the prescriptions needs to be bigger and readable. Consequences to excessive use should also be written on the containers. Indian farmers, specifically in the research area Sangli are not that much compatible to read and understand English language which is very technical language. So, if labels are in local language in simple and easy manner, it may reduce issues in use of pesticide in grape farms.

ii) **Grape farmers to be more diligent to use pesticides in the limited purpose and in the prescribed form and contents.**

In addition to information of use shared by the shopkeepers, the farmers should carefully read and understand the quantity and pesticide and its impact. In case they are not able to read and understand the information, they should get the information from someone who can read and

²⁵ Ashish Goel and Praveen Agarwal, Pesticide Poisoning, The National Medical Journal of India, Review Article, Vol 20, July 2007 Source- file:///C:/Users/Nikhil/Downloads/20-4-Review_Article.pdf

²⁶ Food and Agriculture Organization of the United Nations Rome, 1995, Guidelines for Good Labeling Practices for Pesticides, Source-
http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/Old_guidelines/label.pdf

orient them. If the pesticides in unreasonable quantity is used, it may create negative impact on health and environment

- iii) **Grape farmers to find alternate ways to prevent pests to minimize use of pesticides**
In this research, most of the stakeholders agree that pesticides are dangerous to health and also to environment. Hence, in order to avoid its use in the best possible manner, the farmers should find out suitable alternatives like organic pesticides use of kamganh traps to catch insects, etc. measures.
- iv) **Maximum use of helpline numbers and correspondence address should be done to get more inputs about pesticides by the farmers.**
Many farmers reluctant to call or correspond with the consumer care number. So for detailed inputs, farmers should get inputs from the given numbers and corresponding addresses.
- v) **Pesticide Policies Awareness Programmes , Compulsory Trainings about use of pesticides and distribution of protection kits for grape farmers**
- vi) The central and the state government should initiate such programmes by professional trainers to share all the policies and penal liabilities relating to contravention of pesticide legislation. Such programmes should be conducted by local autonomous bodies. Grape farmers should be convinced about serious impact of exorbitant use of pesticides on environment and the fate of agriculture sector.
- vii) **Consumer Awareness Programmes** The ultimate person who consumes the product is consumer. Hence, there is a dire need of Consumer Awareness about the advantages and disadvantages of the organic Vegetables and fruits. Consumers prefers to purchase shining and catchy product with attractive color and shape. But, sometimes that external beauty of product can be at the cost of nutritious values. So, in order to create awareness among consumers, there is a dire need of consumer awareness programmes by the local autofocus bodies.
- viii) **Frequent audits by the government and heavy punishments**
To cross verify use of pesticides at the fields. As of now, there is no audit mechanism on the field about use or abuse of pesticide. So, the pesticide inspector should be authorized to check proportionate use of grape pesticide on the spot of its use. It will control exorbitant use of pesticides on grapes. The owner of the land, occupier, and labor applying pesticides in the excessive manner should constructively liable for the environmental degradation in that area.
- ix) **Initiative by local Schools and colleges** to teach courses on Agriculture Sector and use of pesticides and its impact on human health. That would surely enhance awareness about adverse impact of pesticides on health. They should identify the local products. By way of special

lectures by experts, workshops, symposium, etc. schools and colleges can bend mind young minds towards environmental protection and sustainable development. As of now, environmental aspects are directly or indirectly taught in the educational institutions. However, by use of role play, drama, educational films, etc. ideas can be penetrated. Audio Visual aids can also be used facilitate the same.

x) **Farmers to be encouraged to report sale or stock of banned grape pesticides to pesticide inspectors**

In spite of ban on certain pesticide, if such pesticide is kept for sale, there is a punishment for imprisonment.²⁷ In case such pesticides are available for sale in cheap rate or on credit, possibility of use is more. Hence, if the farmers are taking initiatives to report such crimes, it will surely prevent the shopkeepers from such malpractices.

xi) **Coordination amongst Agricultural Ministries, Research Centers, and Universities and Training Institutions for common destinations of proportionate use of grape pesticide.**

xii) **Promotion of organic pesticide**

The government should encourage Organic Pesticides sale and programmes for its optimum use. Subsidies can be given for the users.

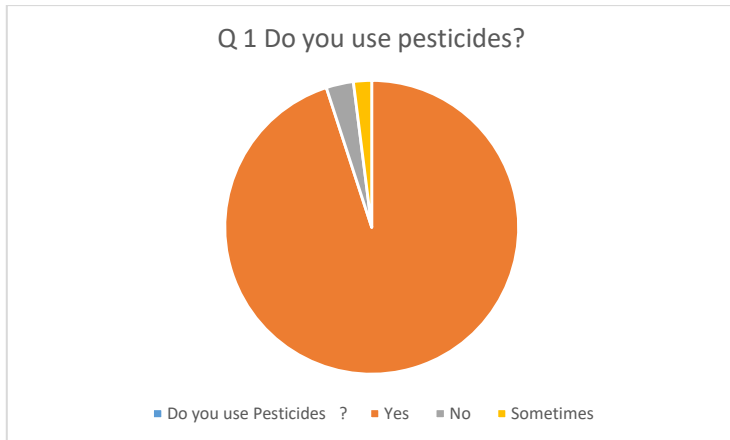
xiii) **Good market for organic grapes**

For exports, there is a good demand for residue free grapes, however each and every farmer is not getting that luxury to export grapes with flag of organic grapes. Hence for local market also, there is a dire need to promote organic grapes.

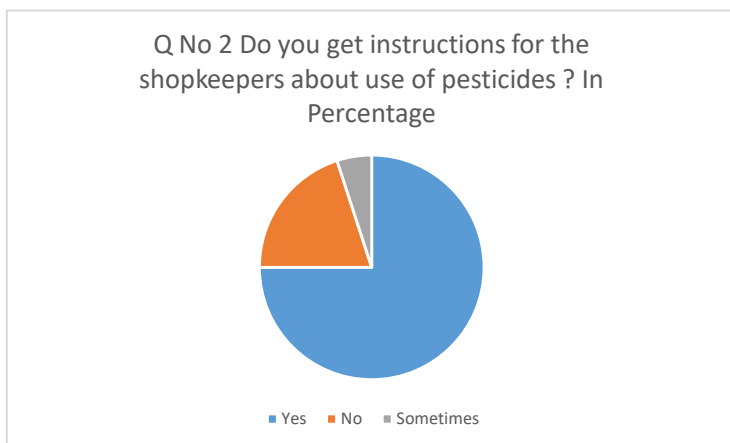
APPENDIX

ANALYSIS OF RESPONSES FROM GRAPE FARMERS

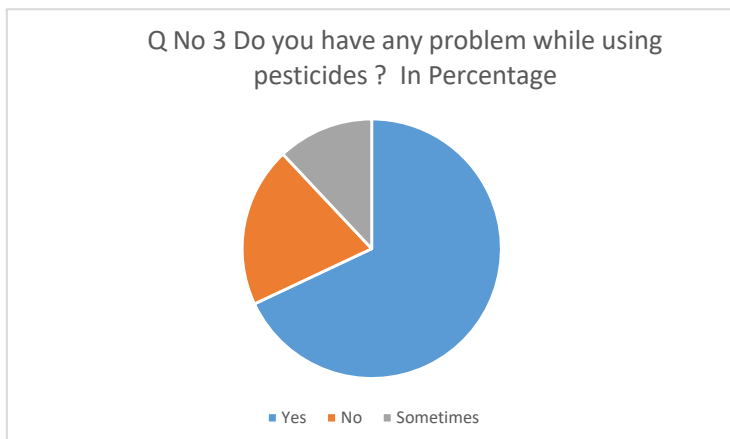
In order to validate objectives and claims in the research, the researcher has circulated questionnaire amongst 200 farmers and could collect responses. Analysis is given in the following manner.



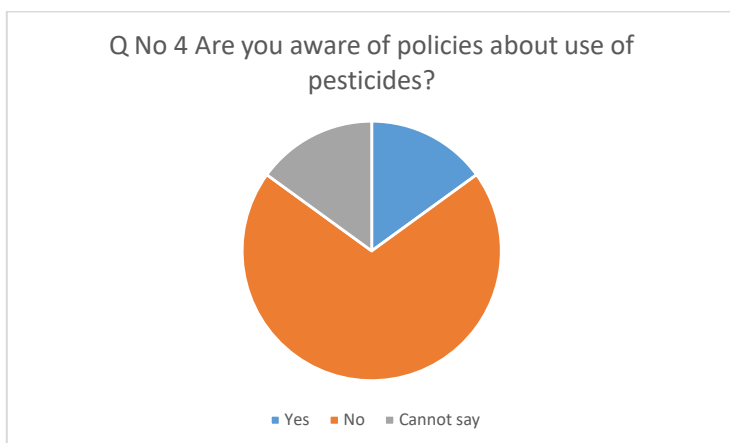
Upon this question, maximum stakeholders responded positively and they told that for grapes productions, use of pesticide is an indispensable task.



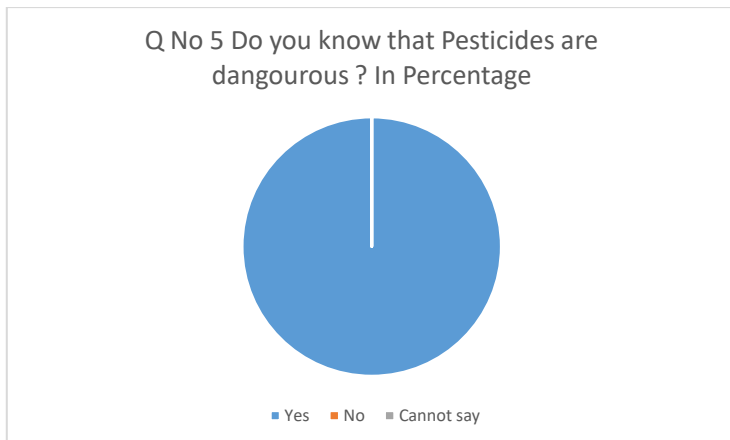
Upon this questions most of the farmers said yes, they get instructions from the shopkeepers while purchasing pesticides. Few said no and they clarifies that if the same pesticide is repeated, then no need to take ny kind of instructions from shopkeepers. Very few of them said sometimes.



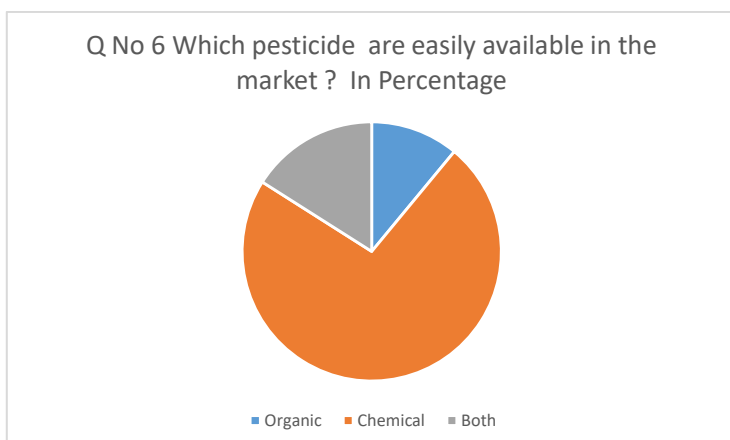
Maximum stakeholders responded positively but they can't assure about the problem is due to use of pesticide or any other reason. Few responded negatively and they said that they do not have any kind of problem for use of pesticides at all because they had been using pesticides from long period. Very few said sometimes they have problems.



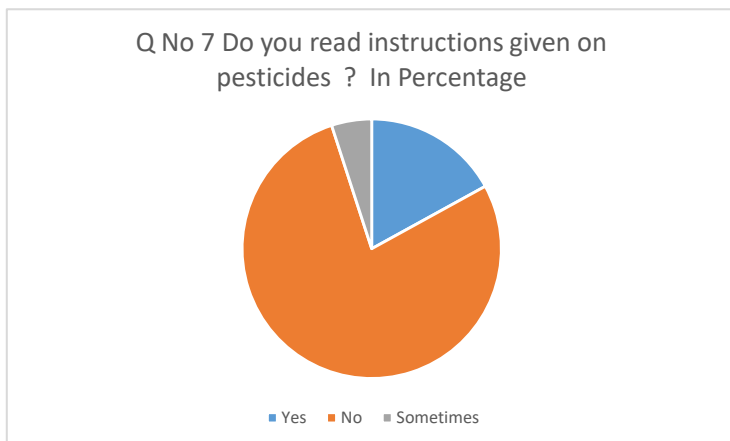
Maximum respondent reacted negatively and said that there might be policies but we don't know. Few said negatively.



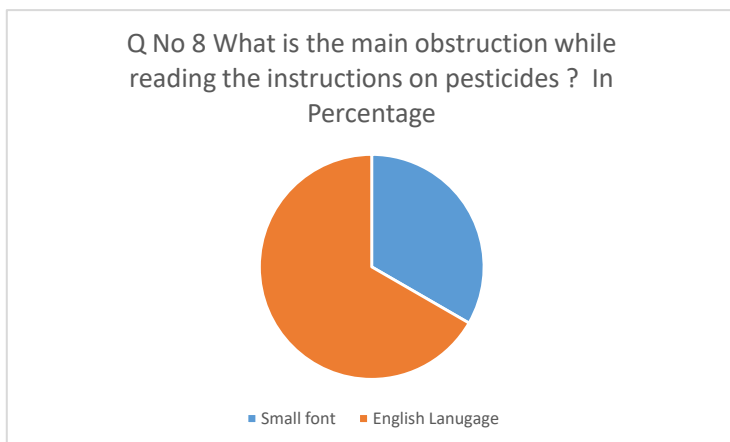
All said yes, they all are aware the fact that pesticides are dangerous to health. But due to unforeseen circumstances they are bound to use pesticides to control pests.



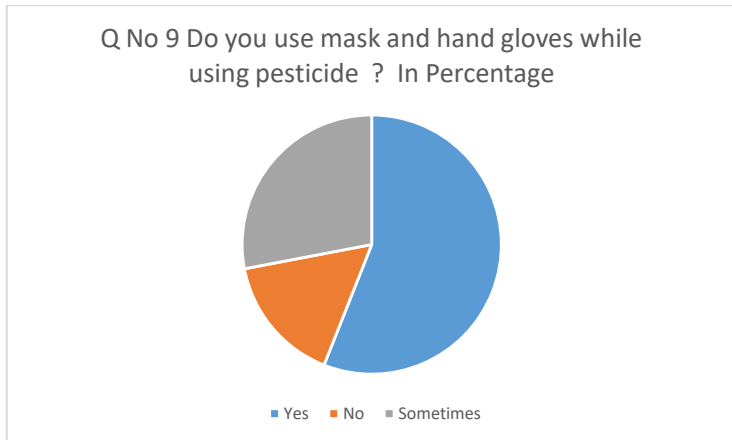
Naturally , most of the respondent said that Chemical pesticides are easily available comparing to organic considering heavy demand from the farmers and its fast results.



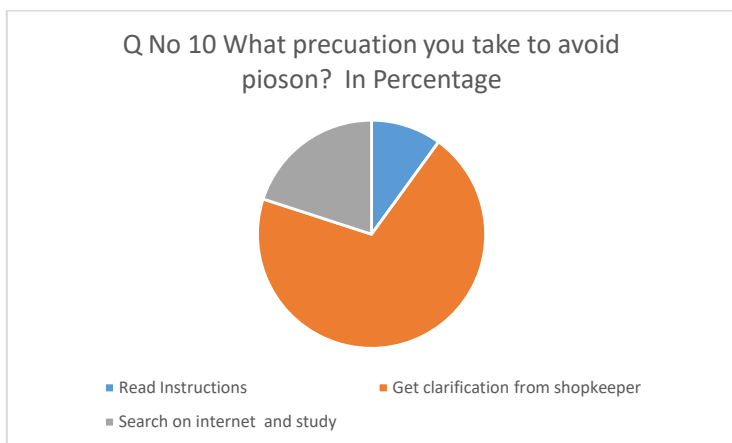
Most of the stakeholders reply on the tips given by the shopkeepers so they don't read the instructions. Few of them read sometimes and very few reads all the times.



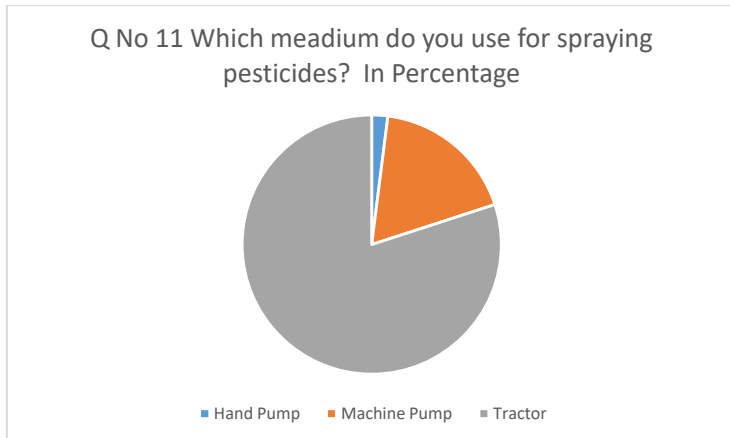
English language is major issues to read and understand the instructions on pesticide packages. Most of the farmers don't have that much of capacity to read and grasp English instructions. And another response is small font to read.



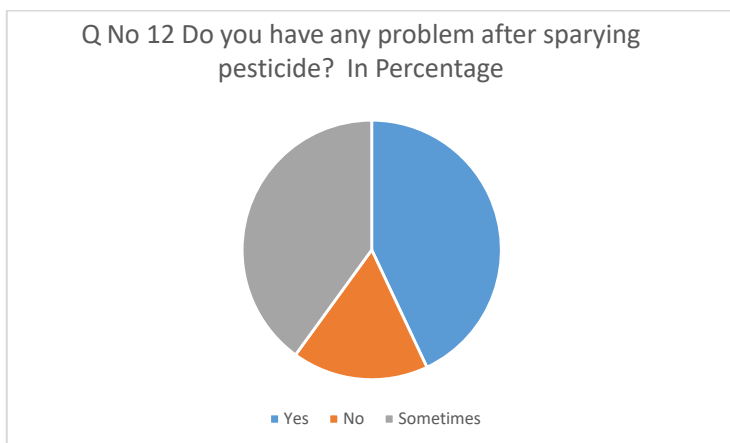
Ideally, most of the manufacturers put instructions to wear mask and hand gloves. However very few follow that instructions. Most of the respondents reacted with diplomatic answer by saying sometimes.



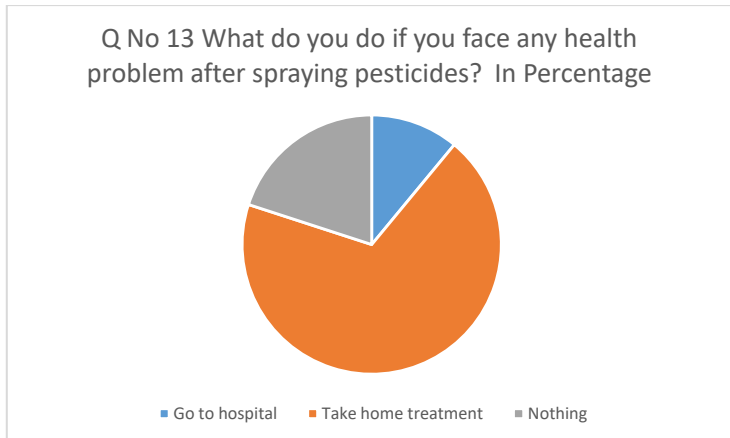
Many get all information from the shopkeepers at the time of purchasing pesticides. Instead of reading instructions on the packages of any internet search, they prefer to follow clarification from the shopkeepers.



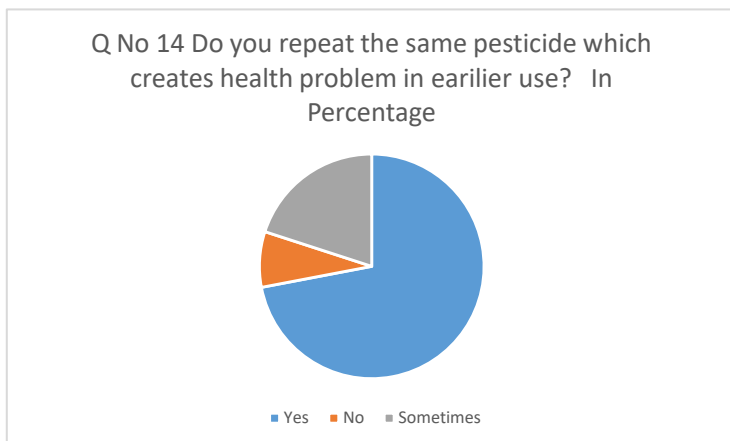
In less time, large number of portion can be covered comprehensive manner. Hence preference if given to Tractor. In case of limited size of land, the farmers go for machine pumps spray. And a very few farmers use hand pumps.



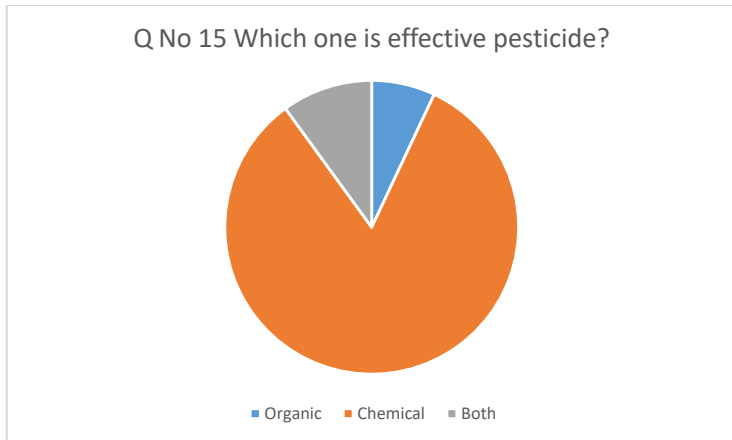
Most of them said no.



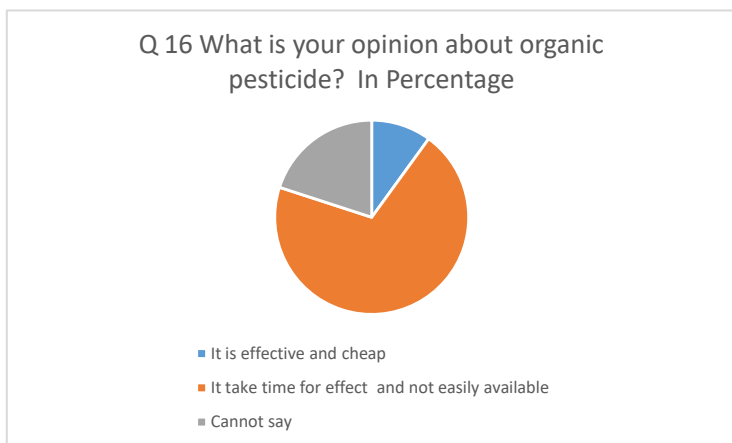
Health problems are subjective and it depend upon capacity of an individual. Hence, maximum stakeholders could not respond cannot say. Few of them responded positively and shared their experience that after spray they feel tired and sleepy and get omitting feeling. And a very few said that they don't have any health problem after spraying pesticides



Many of the respondents replies positively and they said that if any pesticide gives positive results, then they repeat the same pesticide in the sake of results with more precautionary measures.



Most of the stakeholder responded Chemical pesticide is effective pesticide. Chemical pesticides are result oriented comparing to organic pesticides.



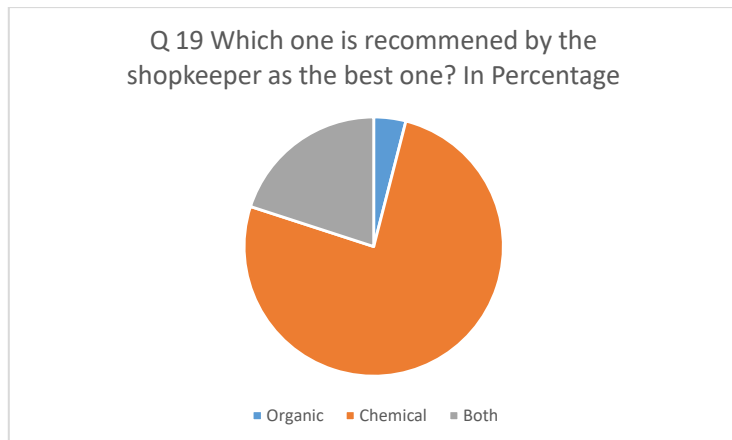
Upon this question, many respondents said that organic pesticides take time for recovery and also not easily available in the market.



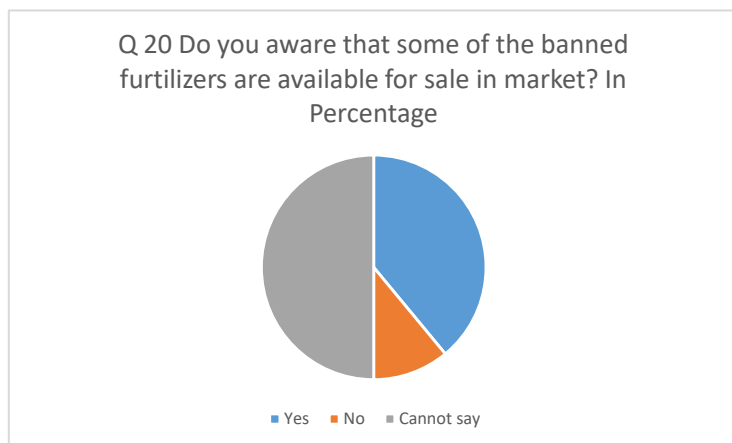
Due to natural and harm free substances of pesticides used in organic pesticide, many stakeholders responded that they do not have any health problem after spray of organic pesticides.



Most of the shopkeepers responded positively. As those stakeholder have limited reading capacity of English and technical language available on the packages of pesticides. But very few stakeholder were very firm and their negative response and they say no.



Most of the stakeholders said chemical considering margin of profit of the shopkeepers in chemical pesticide is much higher than organic one. Few of them said organic.



Many stakeholders could not answer this question as they are not very certain about this issue. However, some of the stakeholder responded positively. And very few could not answer this question.