

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

DEPARTMENT OF ZOOLOGICAL SCIENCE

GENERAL BIOLOGY PROGRAM



**PUBLIC PERCEPTION OF GENETICALLY MODIFIED CROPS IN JIMMA
ZONE DEDO DISTRICT**

A THESIS SUBMITTED TO THE DEPARTMENT OF ZOOLOGICAL SCIENCE, COLLEGE
OF NATURAL AND COMPUTATIONAL SCIENCE, ADDIS ABABA UNIVERSITY IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF
SCIENCE IN BIOLOGY.

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Thesis approval sheet

As a thesis research advisor, I hereby certify that I have read and evaluated the thesis prepared under my guidance, by Assegid Antaro entitled, “Public perception of genetically modified plants in Jimma zone, Dedo district”. I hereby recommended the thesis to be submitted as fulfilling the requirements for the degree of Master of Science in Biology.

Tileye Fayissa (PhD) _____ ____/____/ 2025

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As members of the board of examiners of the Master of Sciences (M.Sc.) thesis open defense examination, we certify that we have read and evaluated the thesis prepared by Assegid Antaro. We recommended the thesis to be accepted as a fulfillment for the requirements of the degree of Master of Science in Biology.

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Contents

List of tables-----	v
List of figures -----	vi
Abbreviations and acronyms -----	vii
Abstract -----	viii
Introduction -----	1
1.1 Background of the study -----	1
1.2 Statement of the problem-----	5
1.3 Research question -----	5
1.4 Research Objective -----	5
1.4.1 General objective -----	5
1.4.2 Specific objective -----	6
1.5 Significance of the study -----	6
1.6 Limitation of the study -----	6
2. Literature review-----	7
2.1 Genetically Modified Organisms -----	7
2.2 Growth of Agricultural Biotechnology and Technology Adoption byFarmers-----	7
2.3 Concern of GMO Related To Health -----	8
2.4 Rise of GM Crops Planted Area-----	9

2.5 GM crops in Ethiopia-----	12
3. Materials and Methods-----	13
3.1 Types of Data Source-----	13
3.2 Research Design-----	13
3.3 Sampling Methods -----	13
3.4 Sample Size-----	Error! Bookmark not defined.
3.5 Data Collection Techniques -----	13
3.6 Description of The Study Area -----	14
3.7. Data Analysis and Interpretation -----	15
3.8 Three Main Categories of participants For the Qualitative Data Collection Were Chosen. -----	15
4. Result -----	16
4.1 The following table shows Socio-demographic characteristics of participants (N = 300)-----	16
4.3 Analysis of Data Gathered From Farmers -----	Error! Bookmark not defined.
4.3 Analysis of Data Gathered From Farmers -----	18
4.4 Analysis of Data Gathered from Consumers -----	20
4.4 Analysis of Data Gathered From Traders -----	21
5. Discussion -----	22
6. Conclusion and Recommendation-----	26
6.1 Conclusion -----	26

6.2 Recommendation-----	27
References. -----	28
Appendices -----	36
Appendix-One: Response Given By Farmers-----	38
Appendix-two:Response given by restaurant owner /traders -----	40
Appendix-three: Response given by consumers. -----	42

List of tables

Table-1. The current African countries with approval of genetically modified crops.....	11
Table 2- Age of respondents found in Jimma Zone, Dedo district.	16
Table 4-Education level of respondents found in the district	16
Table 5- Place of respondents and found in Jimma Zone, Dedo district.	17
Table 6-Distance of respondents from market in Jimma Zone, Dedo district	17
Table-7-.Problems that hinders public perception of GM plants/crops, listed by farmers	18
Table -8-The main problems that create absence of public perception of GM plants/crops listed by consumers.	20
Table 9-Problems that hinders public perception of GM plants/crops, repeatedly listed by hotel owners (traders).	21

List of figures

Figure -1.Global GM Crop Area (Ha. m/Source Agbioinventor, 2024)	2
Figure 2- The main GM crops cultivated in the world (Source Bayer, 2023).	3
Figure-3-Top 5 countries that planted GM Crops (Source Agbioinvestor. 2024).....	8
Figure 4 -Overview of total global area of GM crops from 1996 – 2023, industrial and developing countries in millions ha(Agbioinvestor, 2024).	10
Figure 5- Ethiopian GM Plant (Cotton) Adoption (Source Agbioinverters, 2024)	12
Figure - 6-Map of study area (Dedo)	14

Abbreviations and acronyms

AFIC	Asian Food Information Center
AG	Agriculture Department
BIC	Biotechnology Information Center
<i>BT</i>	<i>Bacillus thuringiensis</i>
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FRG	Fungus-resistant Grapes
GM	Genetic Modification
GMO	Genetically Modified Organisms
IFPRI	International Food Policy Research Institute
ISAAA	International Service for the Acquisition of Agri-biotech Applications
MDSs	United Nations Millennium Development Goals
NPBTs	New Plant Breeding Technologies
SSA	Sub Saharan Africa
USDA	United States Department of Agriculture
WHO	World Health Organization

Abstract

The vast majority of GM planting has been used to increase productivity through improved insect resistance, and/or herbicide tolerance. To grow and consume GM crops, it is important to create public awareness. The current global food security problem is partly due to low productivity of crops due to insect pests, diseases and other a biotic factors. Farmers should have to be aware and cultivate GM plants/crops because; GM crops have been proven to increase productivity and contribute to solve the problem of hunger in the world. The level of awareness of the community on GM plant is not assessed in Dedo district of Jimma Zone, Oromia Regional state, Ethiopia. Therefore, the objective of this study was to evaluate public perception of genetically modified plants/crops in the study area. Cross-sectional (descriptive) study design, non-probability which is (purposive) sampling techniques was used. Both primary and secondary source of data along with qualitative and quantitative data research approach was used. Target respondents who can have the potential to grow GM crops (farmers), persons who can consume, if GM crop if available and person who can have interest to buy and sell if GM crop is available were selected and asked, this include 100 farmers, 100 consumers, and 100 traders, totally 300 individuals were selected as target respondents, from this three hundred respondents, 80% of them are male, the rest are female respondents. 78 % of respondents reported that as they were lacks awareness toward GM crops we can deduce that most of community members do not have adequate knowledge about GM crops in the district hence: there is need for sensitization on GM crops before their release to public. Beside this action in order to solve the above problems formal or informal education is the best solution to create more aware citizens toward GM crops.

Key-words:-GM plants/crops, farmers, trade, consumers, transgenic plant, and living modified plants.

Introduction

1.1 Background of the study

Genetically engineered plant (GM) plant, moreover called hereditarily adjusted crops, transgenic plant, living adjusted living being. GM plants are plants utilized in farming, the DNA of which has been adjusted utilizing hereditary designing strategies (Noack et al, 2024). In any case, in strict sense the utilize of conventional hereditary adjustment in farming dates back to 8000 BCE. In this time, conventional adjustment strategies such as specific breeding and cross breeding in plants were practiced (Jung, 2025). These breeding modalities proceeded until centuries afterward, when, in 1866, Gregor Mendel examined breeding between two distinctive pea phenotypes and found what is presently known as cutting edge day Hereditary qualities (Swaran et al., 2025)

Hereditarily altered (GM) plants in most cases, the point are to present a unused characteristic to the plant, which does not happen actually within the species. Such as creepy crawly resistance, herbicide resilience, biotic and a biotic push resilience, tall wholesome quality, tall abdicate potential, postponed maturing, improved fancy esteem, male sterility, and generation of consumable antibodies. (Belendero,i, 2021). Another major objective for raising the GM plants is their application as bioreactors for the generation of nutraceuticals, restorative specialists, antigens, monoclonal counter acting agent parts biopolymers, and so forward (FAO, 2022).

Worldwide pioneers reaffirmed that agribusiness and provincial advancement are pivotal to worldwide nourishment security and destitution mitigation, and can contribute towards comprehensive financial development, social soundness and the maintainable utilize of common assets (Bull et al. 2021). Science, innovation and social advancements play vital and driving parts in economical rural development (Werkissa, 2022). Different measures on how these will be tended to were prescribed by diverse worldwide bodies such as the Universal Nourishment Approach Investigate Organized (AGRA, 2023). The report recognized still tall number of hungry and malnourished worldwide populace, the winning environmentally-unfriendly agrarian hones being conducted, and expanding populace (Mmbado et al., 2024).

Accomplishing worldwide nourishment security is getting to be progressively challenging and numerous partners around the world are looking for better approaches to reach this requesting objective, and about a decade after the primary transgenic plants were made within the research facility, hereditarily altered nourishment plants were presented into the showcase, GM crops have been demonstrated to be arrangement for the expanding nourishment utilization and mechanical request in numerous nations. (Nayab, 2024)

Since their commercial introduction in 1996, GM crops have been broadly grasped by farmers around the world (Figure 1.1), getting to be an crucial component of the around the world food system and contributing to food security and the quality of food supply chains (Kedisso et al., 2022).

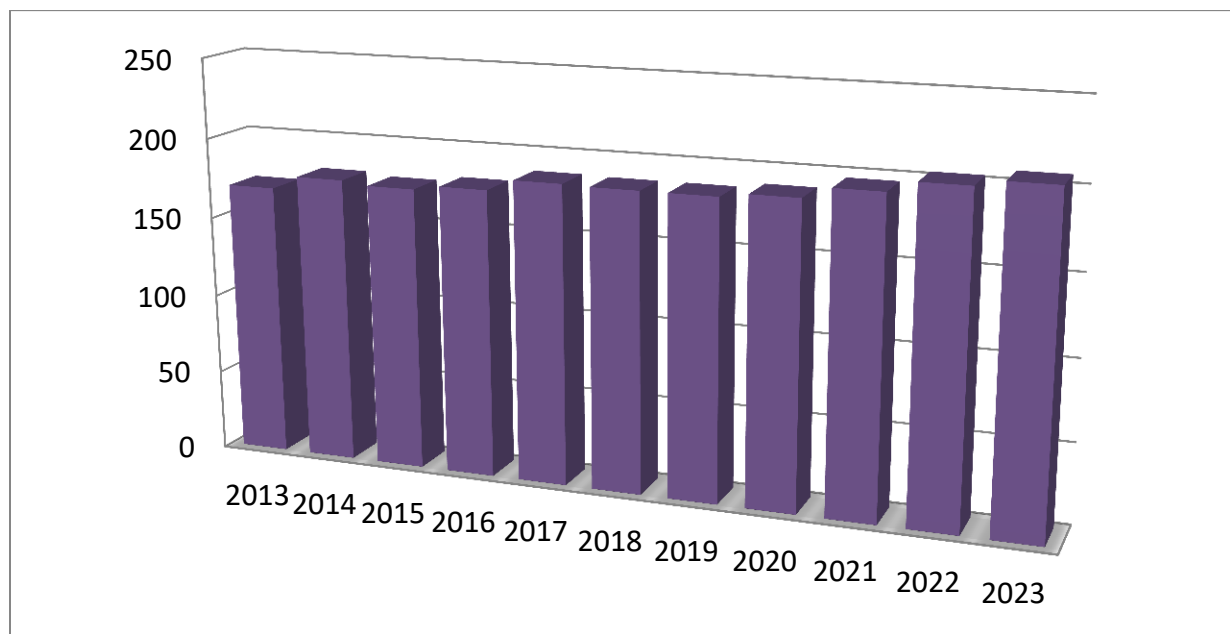


Figure -1.Global GM Crop Area (Ha. m/Source Agbioinventor, 2024)

GM crops are considered the speediest received innovation in later times (Figure 1.1) – the GM trim region accounted for 202.2 million hectares (ha) world-wide in 2022. In 2022, GM

crops spoken to 53% of the by and large seed showcase (\$23,793 million of GM seeds versus \$20,793 million of ordinary seeds) and were developed “in commercially noteworthy amounts” in 27 nations, with the biggest GM planted ranges within the US, taken after by Brazil and Argentina. In 2022, the worldwide planted region expanded by 3.3%, with the biggest increments in Brazil, Australia, India, Pa

There were 14 GM crops commercialized, counting corn, soybean, cotton, canola, horse feed, sugar beets, sugarcane, papaya, safflower, potatoes, eggplant, squash, apples, and pineapple. Soybean (51%), corn (34%), and cotton (10%) compose a add up to of 95% (Figure 1.1) of the overall GM advertise, for which the foremostimperative GM crop-growing nations are coming toshowcaseimmersion in GM appropriation rates (US: 95%; Brazil: 94%; India: 94%; Argentina: 100%; Canada: 90%). All GM editrange, is concentrated in 5 nations: US (74.69 million ha), Brazil (63.2 million ha), India (12.35 million ha), Argentina (23.41 million ha), and Canada (11.32 million ha). (Bayer, 2023)

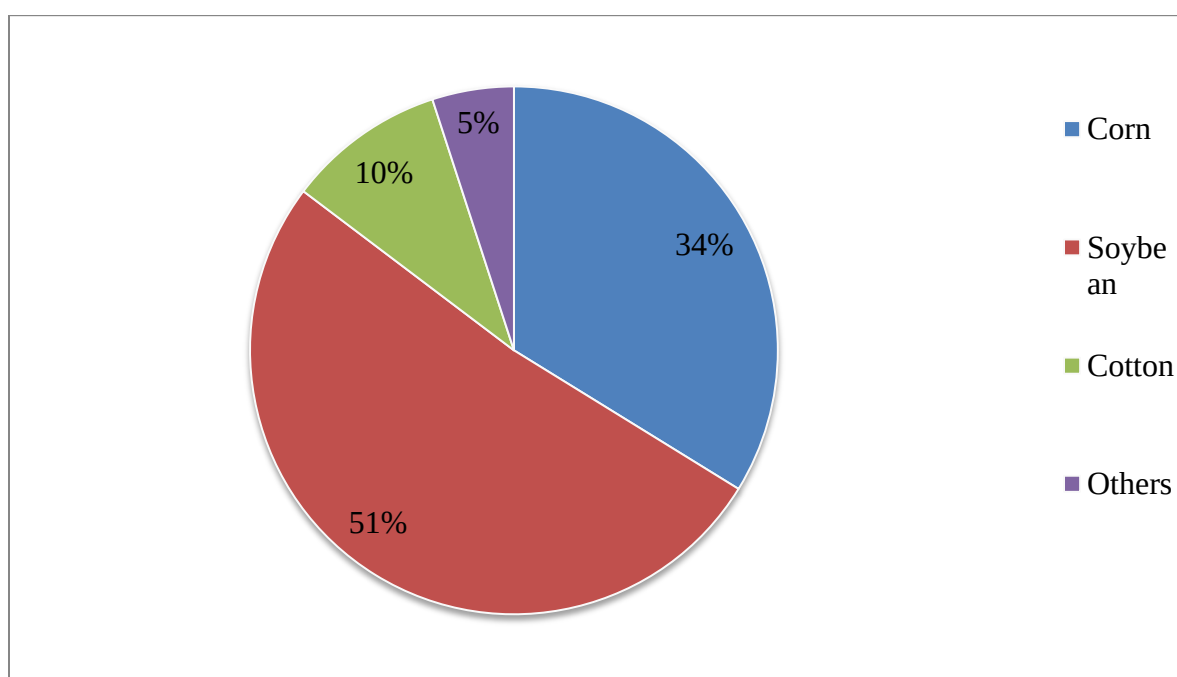


Figure 2- The main GM crops cultivated in the world (Source Bayer, 2023).

Be that as it may, Sub-Saharan nations are discernibly slacking behind within the appropriation of GM crops (ISAAA, 2021) Africa as a entire contributed less than 5% of worldwide generation of GM crops in 2016. By 2018, at slightest four Burkina Faso, Egypt, South Africa and Sudan, at a few point within the past, created recognizable amounts of GM crops (Shake et al, 2023). Africa right now remains the locale with the most noteworthy potential to receive GM crops. South Africa developed 3 million ha of maize, soybean, and cotton, whereas cotton was more over developed in Sudan ha), and Ethiopia (311 ha), for a add up to of 2.9 million ha (Adugnaw, 2022)

Edit generation in Ethiopia is hampered by a assortment of variables, among them subsistence cultivating, wasteful utilize of cultivate inputs, climate alter, plant bothers, arrangement instability and moo intrigued in agrarian credit are the major ones (Feyisa, 2022). Hence, Ethiopian policymakers recognized hereditarily designed crops as a practical strategy of expanding nourishment efficiency and quality (Kiros et al., 2018). Ethiopia is among the foremost crowded countries in Africa with horticulture being the base of its economy. Agribusiness accounts for a noteworthy parcel of the GDP and utilizes around 85% of the populace (Kiros et al., 2018). This segment is providing nourishment for the ever expanding human populace and nourish for creatures. Be that as it may, it is epitomized as a transcendently low-input moo out-put framework overwhelmed by smallholder makers creating rural items that are distant less than sufficient (York Biotech Campus, 2025)

Since Ethiopia is one of the world most food-insecure nations, the government has endeavored to define and execute different financial development procedures, with rural improvement taking priority (Feyisa, 2022). Hereditarily built crops may be an alternative to extend rural efficiency in creating nations like Ethiopia. Cotton is developed in a run of regions all through Ethiopia. It is assessed that roughly 3 million hectares of arrive are appropriate for cotton development (Gould, 2020). In spite of the fact that Ethiopia encompasses a long history of cotton development, it as it were develops 3% of the full arrive reasonable for it (Begna, 2020).

1.2 Statement of the problem

According to different global bodies 2030 G.C, afterward, human population will increase in the world, food supply have to increase, unless otherwise famine will happen, and so many people will die of hunger. To prevent this we have to use advanced technology such as GM plants/crops in our agriculture, because GM plants/crops can increase productivity than non-genetically modified plants/crops. According to the information obtained from Agricultural and Rural Development offices of the study area, they have more than enough suitable environments and resource to cultivate genetically modified plants/crops, the farmers should have to increase their productivity. In order to increase productivity the farmers, and consumers must well aware GM plants/crops, or public perception of GM plants/crops is needed. Farmers may use genetically modified plants/crops to increase productivity and consumers should be aware of the value of consuming GM crops. Therefore, the objective of this study is to determine the level of awareness of GM crops by the community in the study area.

1.3 Research question

1. Are the farmers and consumers found in Dedo district aware of Genetically Modified crops/plants?
2. Are they interested to cultivate genetically modified crops/plants, if they get the opportunity?
3. Are the consumers interested to use genetically modified crops for food?

1.4 Research Objective

1.4.1 General objective

The general objective of this study is to investigate the level of public perception of genetically modified plants in Dedo district, of Jimma zone.

1.4.2 Specific objective

The specific objectives of this study are

To generate information that will lead to awareness creation of GMOs.

To assess farmer's need, in order to cultivate genetically modified plants/crops.

1.5 Significance of the study

The result of this study will be important to understand the extent to which the people in Dedo district of Jimma zone perceive GMOs. Also, the study result generates information that will lead to awareness creation of GMOs in the Dedo district and the same experience can be used for awareness creation in other districts in Jimma zone. In addition, people will become ready to accept GMOs such as Bt cotton and TELA maize when they are introduced to the area in the future.

1.6 Limitation of the study

The limitation of the study is, it's limited to Jimma zone, Dedo district only. If it includes other areas, it would be better but the researchers have very limited study time and budget to include wider areas. We believe wider areas will be included by other researchers in the future.

2. Literature review

2.1 Genetically Modified Organisms

Genetically modified crops (GMO) are life forms containing one or more qualities imported falsely within the research facilities by utilizing hereditary building strategy, The objective of genetic modification is to supply improved highlights to plants by changing their hereditary cosmetics (FAO, 2021)

2.2 Growth of Agricultural Biotechnology and Technology Adoption by Farmers

When GMOs in farming were propelled commercially, there was no diagram for bringing such a troublesome nourishment innovation to showcase. (FAO, 2022). Approximately a decade after the primary transgenic plants were created within the research facility, hereditarily altered nourishment plants were presented in to advertise. In 1994, the FLAVR SAVR tomato, adjusted to delay untimely natural product softening, hit the racks of U. S. basic supply stores (ISAAA, 2017).

From 1996 on, creepy crawly safe Bt maize and oilseed assault were planted. Hereditarily altered edit generation has been generally concentrated in mechanical nations eg US and Canada (FAS Astana Staff, 2024). In spite of the fact that industry based information appears the drift of hereditarily adjusted trim generation moving to creating nations, the US still holds (Figure 2.1) the lion's share (45%) of the worldwide hereditarily altered edit generation. Industry-based information moreover appears a consistent increment of regions beneath hereditarily altered edit development; be that as it may the rate of worldwide rural and arable arrive possessed with hereditarily adjusted crops is still restricted (EFSA, 2025)

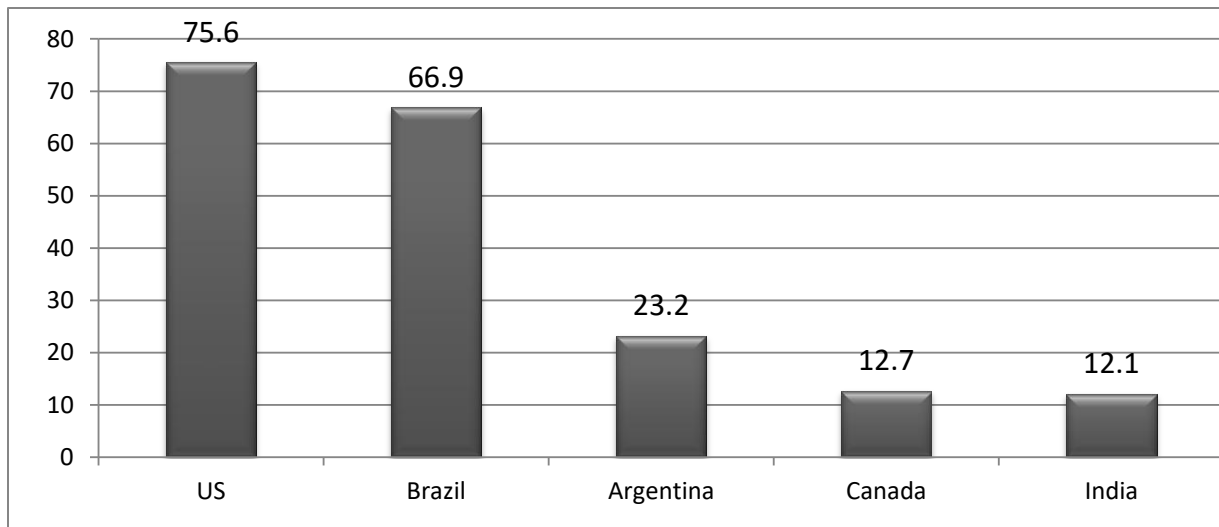


Figure-3-Top 5 countries that planted GM Crops (Source Agbioinvestor. 2024)

Cultivation is the major money related spine of the world in moving forward the work of the people contributing to the foremost critical improvement family thing of the world. Innate alteration conceivably benefits farmers in made and making countries. (FAO, 2022). Around the worldask for food is growing with the people and arable arrive besides decreased. In any case agrarian effectiveness is impacted by biotic and a biotic-confinements which basically and unfavorably constrained the alter proficiency to underneath its yield potential (Ewa et al., 2022). Hence, worldwide agrarian efficiency must increment in arrange to meet the expanding nourishment requests (ISAAA, 2018)

2.3 Concern of GMO Related To Health

When the items of GM plants are devoured by people and creatures, there's continuously a fear and chancewithin the society that these plants may makewellbeingissues or may lead to the advancement of more up to date microbial strains which will be pathogenic. Encourage, the plants themselves may be vulnerable to such dangers (FAO, 2020)

GMO nourishments are carefully examined some time recently they are sold to open to guarantee they are as secure as the nourishments we as of now eat and they don't influence you in an unexpected way than non-GMO nourishments (Division of Wellbeing & Human Administrations, 2024)

2.4 Rise of GM Crops Planted Area

Hereditarily altered (GM) crops were presented to horticulture frameworks in mid-nineties by private division. GM crops have been proposed as arrangement to the double challenge of assembly the requests of developing worldwide populace whereas relieving the natural impacts of farming. Abdicate increments from GM edit appropriation may diminish the motivations to change over woodlands to croplands, in this way decreasing biodiversity misfortune and nursery gas outflows related with arrive utilize alter (Noack, 2024).

South Africa is the biggest GM edit cultivator (2.7 Million ha) in Africa, taken after by Sudan (243,000 ha), Ethiopia (1300 ha), Eswatini (250 ha) and Kenya (1500 ha) (Kedisso, 2022). To date the governments of 12 nations in SSA have a useful biosecurity administrative system. The governments of seven nations “Ethiopia, Eswatini, Kenya, Malawi, Nigeria, South Africa and Sudan “ have approved the environmental release of GM crops (Turnbull et al., 2021)

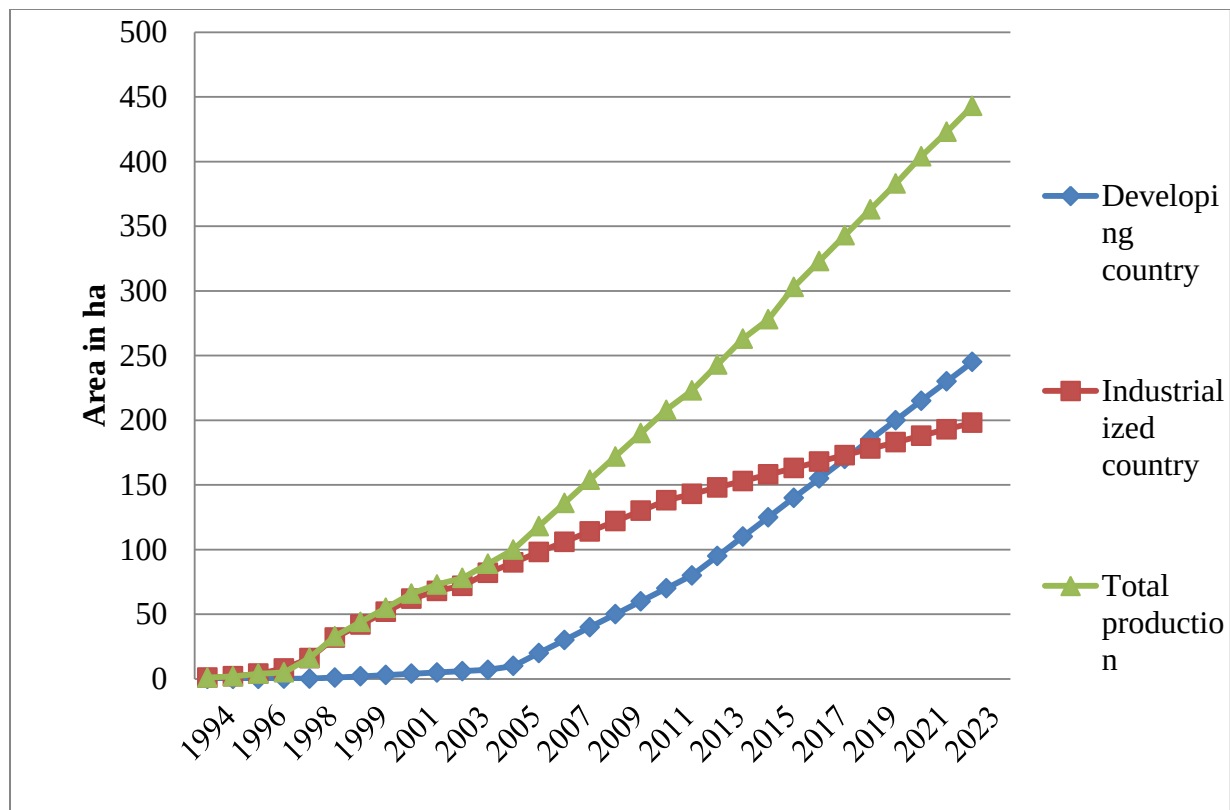


Figure 4 -Overview of total global area of GM crops from 1996 – 2023, industrial and developing countries in millions ha (Agbioinvestor, 2024).

Right now more than a dozen of GM crops were detailed to be developed on about 200 million hectares (185million hectares), spread over 27 nations and 18 million ranchers. GM crops were at first fruitful in mechanical nations but, slant has moved presently. 100 million hectares were developed in creating nations and 85 million hectares were developed in created world in 2018 through modern nations and crops are included each year to the list driving to expanded range in both created and creating nations (Nuffield Board on Bioethic, 2020) As it were eleven of the fifty-four African countries (Table -1-), Burkina Faso, Egypt, ESwatini, Malawi, Ethiopia, Ghana, Kenya, Nigeria, South Africa, Sudan, and Zambia as of this minute have endorsed the development of GM crops (Goodman., 2024)..

Table-1. The current African countries with approval of genetically modified crops (Source Mombado),

SN	Country	Crop	Scientific name
1	Burkina Faso	Cotton	<i>Gossypium histum L</i>
2	Egypt	Maize	<i>Zea mays L</i>
3	ESwatini	Cotton	<i>GossypiumGossypiumhistum L</i>
4	Ethiopia	Cotton	<i>Gossypium hirsutum L</i>
5	Ghana	Cowpea	<i>Vigna unguiculata</i>
6	Kenya	Cotton and Maize	<i>Gossypium hirsutum L and Zea mays L</i>
7	Nigerian	Cotton	<i>Gossypium hirsutum L.</i>
		Cowpea	<i>Vigna unguiculata</i>
		Maize	<i>Zea mays</i>
		Soybean	<i>Glycine max L</i>
		Wheat	<i>Triticum aestivum</i>
8	South Africa	Argentine Canola	<i>Brassica napus</i>
		Cotton	<i>Gossypium hirsutum</i>
		Maize	<i>Zea mays L.</i>
		Rice	<i>Oryza sativum L.</i>
		Soybean	<i>Glycine max L.</i>
9	Sudan	Cotton	<i>Gossypium hisutum L.</i>
10	Zambia.	Maize	<i>Zea mays L.</i>
11	Malawi	Cotton	<i>Gossypium hirsum L</i>

2.5 GM crops in Ethiopia

One of the foremost commercially reasonable crops in our nation Ethiopia is cotton (*Gossypium hisrtum*) which is basically developed for yield of build up (Chirato et al. 2024). Cotton is the major industrial fiber trim that's broadly developed around the world and features a enormous affect on the political and financial issues that numerous countries confront (Gebregergis et al., 2020).

Despite the percentage increase in 2022 GM plantings were only 8900 hectares, representing 10.9 % of the country's total cotton area. The Ethiopian government authorized the use of seeds sourced from India, typically JK Agri Genetics (Swadhin, 2025), however, since that time there has reportedly been greater use of seeds purchased from uncertified sources on the Ethiopian border. In a similar situation to Sudan, Ethiopia's GM cotton area planted with solely insect resistant varieties (Agbioinventor, 2024). The following figure (Figure 2.2) shows growth of GM cotton plants land area in hectares.

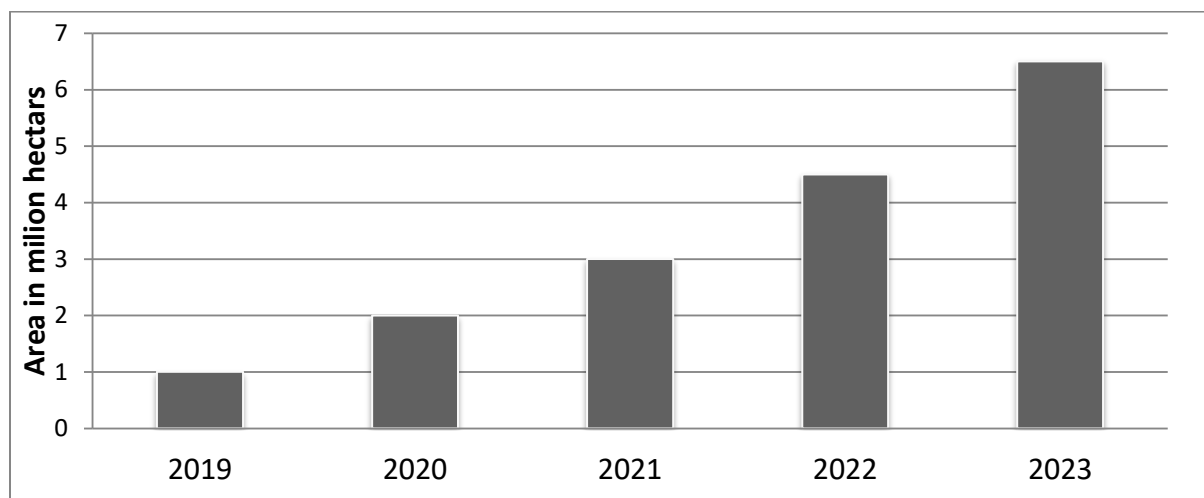


Figure 5- Ethiopian GM Plant (Cotton) Adoption (Source Agbioinverters, 2024)

3. Materials and Methods

3.1 Types of Data Source

Both primary and secondary source of data were used to achieve the objective of the study. The primary data is obtained from respondents through questioner from individual, and secondary sources of data obtained from different documents, and report of agricultural office of the district.

3.2 Research Design

A cross-sectional study design using purposive (judgmental) sampling techniques has been conducted among respondents in the study area.

3.3 Sampling Methods

Non probability or judgmental sampling techniques was used. This method is used due to the reason that, it is the most important techniques to find convenient peoples that provide the necessary data for the researcher as the researcher get facts, full, reliable information from agricultural and market office of the district.

3.4 Sample Size

A total of three hundred subjects (60) 20% female respondents the other are male respondents, in three groups for each group 100 (33.33%) respondents were involved and interviewed using pre tested semi-structured questionnaires, the target population of this survey consists of genetically modified plants or crops farmers, trader or hotel servants, and consumers, which consisted of both open-ended questions

3.5 Data Collection Techniques

The following data collection techniques were used. Those are interview (face to face), directobservation, and questionnaires. These methods have been used to collect more

information about public perception of GM plants/crops. The questionnaire was prepared in English but it was translated into local language (Afaan Ormo) during the interview.

3.6 Description of The Study Area

This study was conducted in Dedo district. In Jimma Zone, Oromia regional state Ethiopia. Jimma town, the capital of Jimma Zone is located 352 km southwest of Addis Ababa. The study area was selected purposively based on the high cereal crops production. The village is geographically located at, 7° 13'-8°39'00" N, 36°43'-37°12'00"E, ranges from 880 to 2660m above sea level. Dedo village is found 20km far from Jimma town, in south west direction. Coffe(*Coffea Arabica*), and Khat(*Catha edulis*) are the major cash crops. Enset(*Ensete ventricosum*) Cheesman, fruits tree such as Avocado (*Persea americana*), mango (*Mangifera indica*), papaya (*Carica papaya*), potatoes (*Solanum tuberosum*), and sweet potatoes (*Ipomoea batatas*), and vegetables are also grown in considerable amounts for household consumption and local market.

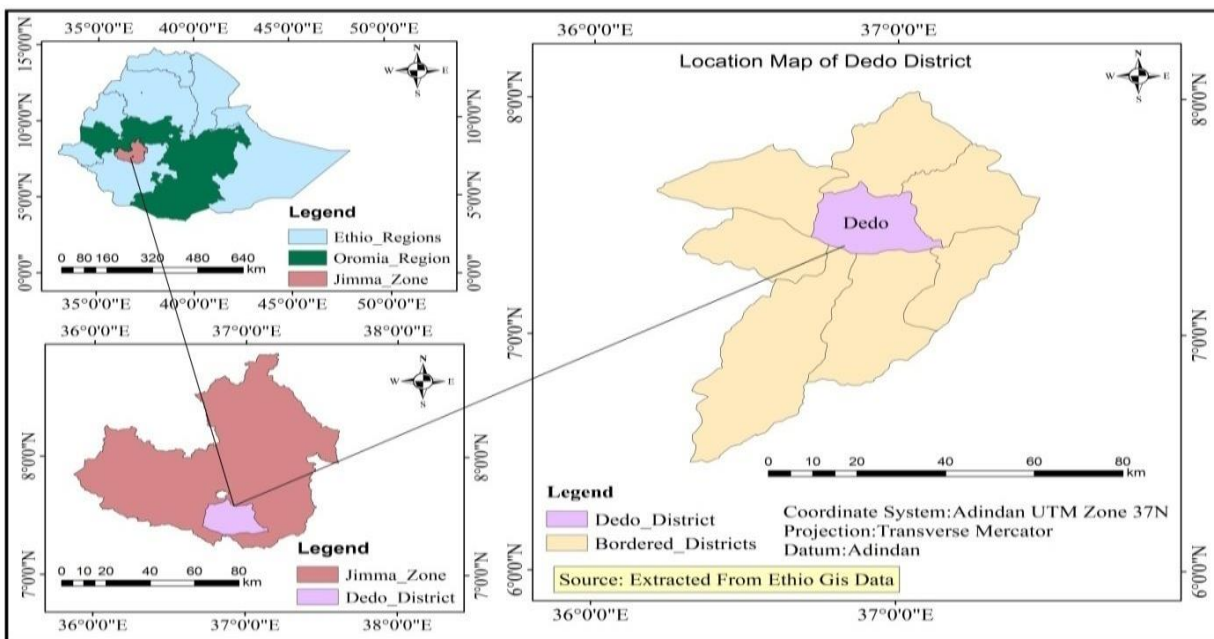


Figure - 6-Map of study area (Dedo)

3.7. Data Analysis and Interpretation

The data was analyzed and interpreted based on the primary data gathered from the participants. The first part of the questionnaire was personal information of the respondents, which include sex, age, education level, place of family, distance from the market, and job, and the second part is question that evaluates public perception of GM plants/crops as shown in table

3.8 Three Main Categories of participants For the Qualitative Data Collection Were Chosen.

Three main categories of participants for the qualitative data collection were chosen, these were agriculturists, dealers, and customers assembled through meet, coordinate perception, and survey frame. Extra to this survey, questioner, and coordinate perception, numerous as sources that show discernment of GM plants/crops by open around consider region, such as other composed reports were utilized. Amid collection of essential and auxiliary information, the analyst utilized purposive testing method by disseminating 100 survey to agriculturists, 100 for lodging workers (dealers), and 100 moreover shoppers, completely 300 surveys are arranged to respondents found in Dedo locale, Jimma zone which incorporates both male and females. The first part of the information is personal information of respondents, and second part of the questionnaire is response that evaluates perception of GM plants/crops.

4. Result

4.1 The following table shows Socio-demographic characteristics of participants (N = 300)

Totally there are 300 respondents found in the district, selected from the study area, out of these each of them are 100 this are, farmers, consumers, and traders (Table 2).

1. Table 2- Age of respondents found in Jimma Zone, Dedo district.

Variables	Work category			Total
	Farmers	Consumers	Traders	
Age groups				
≤ 18	5	10	8	23 (7.7%)
19-38	32	28	41	101 (33.6%)
39-59	39	40	31	110 (36.7%)
≥ 60	24	22	20	66 (22%)
Total	100 (33.3%)	100 (33.3%)	100 (33.34%)	

2. Table 3- Gender of respondents found in Jimma Zone, Dedo district

Sex	Sex of respondents			Total
	Farmers	Consumers	Traders	
Male	86 (86%)	81 (81%)	75 (75%)	243 (80%)
Female	14 (14%)	19 (19%)	19 (19%)	57 (19.6%)
	100 (33.33%)	100 (33.33%)	100 (33.34%)	300 (100%)

In addition to the following personal information, you will notice that, as the education levels (grade) goes up or increases their awareness level/knowledge level increases to ward genetically modified plants, result absence of adoption or of public perception to ward genetically modified plants increases.

3. Table 4-Education level of respondents found in the district

variable	Education level			Total
	Farmers	Consumers	Traders	
Illiterate	6 (6%)	2 (2%)	4 (4%)	12 (4%)
1-8	73 (6%)	58 (58%)	49 (49%)	131 (43.7%)
9-12	21 (21%)	29 (29%)	38 (38%)	88 (29.34%)
College	-	11 (11%)	9 (9%)	20 (6.7%)
Total	100%	100 %	100 (100%)	300 (100%)

A total of 300, out of 300 respondents /100farmers, 100 consumers, and about 100 traders asked from these much number individuals (Table 5)

4. Table 5- Place of respondents and found in Jimma Zone, Dedo district.

Residence	Farmers			Consumers			Traders		
	M	F	T	M	F	T	M	F	T
Urban	96	2	98	45	35	80	47	33	100
Rural	1	1	2	15	5	20	25	75	100
Total	97	3	100	60	40	100	72	28	100

5. Table 6-Distance of respondents from market in Jimma Zone, Dedo dist

Variables	Distance arketf respondents from me			Total
	Farmers	Consumers	Traders	
$\leq 0,5\text{km}$	11	14	18	38 (12.7%)
0.6--- 1 km	15	15	24	54 (18%)
1.1—2km	33	30	25	88 (29.4%)

2.1—3 km	26	21	25	72 (24%)
3.3—4km	9	9	5	23 (7.7%)
≥4.1km	6	11	3	20 (6.66%)
Total	100	100	100	300 (100%)

4.3 Analysis of Data Gathered From Farmers

Table-7.-Problems that hinders public perception of GM plants/crops, listed by farmers

No.	Problems	Respondents	Percent
1	Did not know what means by GM plants/crops, this result absence of perception, in the community	25	30 %
2	Awareness and knowledge: lack of awareness can contribute to negative perceptions or reluctance toward GM technology	35	45 %
3	Lack of training: bring absence of awareness to ward GM plants/crops then finally leads to absence of public perception within society.	3	2 %
4	Availability of GM plants/crops seed; as a result public disinterested to cultivate GM plants/crops then at the end brings loss of public perception	6	3 %
5	Limited access to information: bring lack of information among public toward GM plants/crops, then at the end absence of public perception happen.	3	3 %
6	Focus on traditional farming: this action prevents the cultivator to cultivate GM plants/crops and unable to test, weather the GM crop is good or bad.	3	3 %
7	Cultural attachments to traditional crops; also	2	2 %

	public unable to use GM plants/crops, and then finally it creates societies that are not aware about GM plants/crops, this action create public that are wrong taught about GM crops/plants.		
8	A strong preference for indigenous crop varieties makes the society to fear planting/to use new technology, then at the end absence of perception happen.	2	2 %
9	Poor communication:- absence of public perception of GM crops/plants and hinders the cultivation of GM plants/crops	2	2 %
10	Economic impact: the fear that GM plants/crops could negatively affect the agriculture and the livelihoods of small holder farmers is also prevalent	2	3%
11	Access to technology: there are question s about whether the technology for cultivating GM crop will be accessible to small farmers	2	3%
12	Biodiversity; there is a fear that GM plants/crops could harm biodiversity, including wild relatives of crops and traditional varieties	2	2 %
13	Transparency: there is lack of transparency in the approval and introduction of GM crops, leading to questions about how decisions are made.	3	1 %
14	Environmental impact: concerns exist about potential negative effects on soil, water, and ecosystems from the use of GM crops	10	10%
	Total	100	100%

4.4 Analysis of Data Gathered from Consumers

Table -8-The main problems that create absence of public perception of GM plants/crops listed by consumers.

No	Problems	Respondents	Percent (100 %)
1	Did not know what means by GM plants/crops, and food derived from GM plants or crops, this result absence of perception, in the community	30	30 %
2	Lack of Awareness and information; many people's lack clear understanding of what GM plants/crops derived food and this result absence of public perception.	45	45 %
3	Crop landraces: some worry that GMOs could displace or contaminate local, diverse crop varieties, which are important for farmers found in the study area	4	4 %
4	Religious beliefs are the main factors which create absence of perception within community.	6	6 %
5	GM plants/crops, because of their culture public did not need them or chosen by in the study area. public in the study area, even so they are rich in different nutrients	2	2 %
6	Some peoples assume GM plants/crops are poison; because of this activity leads public in order to have wrong perception toward GM plants/crops derived food.	1	1 %
7	Health related problems: people's fears to consume GM Crops derived food, this problem made them to hate GM derived food, and then at the end absence of public	5	5%

	perception toward GM plants/crops occur.		
8	Consumer's labeling: the absence of mandatory labeling for GM foods makes it difficult for consumers to make informed choices	7	7%
	Total	100	100 %

4.4 Analysis of Data Gathered From Traders

Table 8-Problems that hinders public perception of GM plants/crops, repeatedly listed by hotel owners (traders).

No	Problems	Respondents	Percent
1	Did not know what means by GM plants/crops, this result absence of perception, in the societies	48	48%
2	Awareness and knowledge: lack of awareness can contribute to negative perceptions or reluctance toward GM technology	49	49 %
3	It is a lengthy and expensive process to bring any GM plants to the market.	3	3 %
	Total	100	100%

5. Discussion

Hereditarily adjusted (GM) crops speak to the foremost rapidly received innovation within the history of agribusiness (FAO, 2022). Agreeing to FAO, each year, 20% of worldwide nourishment generation is misplaced due to bothers. Plant infections fetched the worldwide economy around \$220 billion every year and obtrusive insecticides costs around \$70 billion. FAO gauges that misfortunes caused by weeds may account for 5% to 10% of agrarian generation in created nations, and up to 20% to 30% in creating nations. Extra to FAO diverse thinks about (Naveen et al., 2024) depict this marvel.

According to the respondent's data analysis shows that 45% of respondents absence of public perception toward GM crops were happened as a result of awareness and 30% did not know what mean by GM plants/crops, the respondents strongly agreed with the statement of 'absence of enough information result absence of public perception to ward GM crops'

In general, as it were 11 (3.66%) of the 300 respondents detailed that: they had ever listened of GM crops, In expansion, none of the respondents demonstrated that they had no understanding of GM crops communicated the require for more data approximately GM crops. Out of 11 (3.66%) respondents that detailed they had ever listened of GM crops. This considers was comparative with 7% (Ashebir, 2022). None of them had not eaten GM crops some time recently. Moreover, out of the 11 (3.66%) respondents, the most data source for GM crops was the most stream media (radio, TV, and daily papers) and social media (confront book). Two hundred ninety (98.66%) respondents considered cross breed discharged assortments to be the same as GM crops/plants.'

As the think about appeared that (Iqbal, 2024), lion's share of respondents detailed that they had moo information levels on GM crops, out of 300 respondents met, as it were 3.66% of them had ever listened of GM crops and, 24% of the respondents have no understanding of GM crops. As

it were minority of them have positive state of mind toward GM plants to purchase, eat, offer, and develop them.

As the level of instruction increments they get it more than uneducated individual, so this appears that, instruction and recognition of GM crops have coordinate relationship, meaning taught individual can have more information approximately GM crops/ as the level of instruction expanded level of discernment increments, The current consider is somewhat comparable with the ponder conducted in Uganda (Mustefa et al., 2023).

Instruction plays an vital part in how GM crops are seen. This may play an imperative part in their appropriation, (Dessi et al., 2024) detailed that ranchers or buyers who need instruction and appropriate information on GM crops are likely to have a misshaped viewpoint on them. A study on ranchers and customers discernment of GMOs in Korea demonstrates those agriculturists and shoppers with higher levels of instruction, pay, and nourishment association and more introduction to negative data almost GM crops tended to overestimate their genuine information level. They moreover famous that shoppers with less instruction and higher salary were more likely to think little of their information on GM crops as appeared by the think about (Hasan et al., 2025)

Within the area nearly all respondents cannot get sufficient data, since they cannot utilize or incapable to utilize unused innovation. To utilize the innovation it needs aptitudes and information. Consequently, they cannot get sufficient data approximately hereditarily adjusted crops, the only source of data within the area is standard media (radio), this result nonattendance of discernment toward hereditarily adjusted crops. Most of respondents over and over specify destitute communication in between ranchers/ neighbors, this activity once more make nonattendance of open recognition of GM trim

The respondents information examination appeared that 58.4% of respondents concurred and 16.8% of the respondents unequivocally concurred with the articulation of "there may be a fear that GM plants/crops might hurt biodiversity, counting wild relatives of crops and conventional varieties" • Most of the respondents detailed that climate alter has in a

roundabout way been a driving constrain towards the era of information on GM crops, since these crops can be altered to adjust to particular climates. (ISAAA, 2022).

The finding of the present study were slightly similar to those of study conducted in Uganda (Mustefa et al., 2022). To make the consumers more interested to use the product of GM plants or crops, making road suitable for transportation means indirectly the distance through which the product of GM plants transported to market is reduced/close for GM plants product cultivators. This action will help farmers to sell the product, so that consumers can get what they need in the market, and can consume what they need to consume. Therefore the presence of suitable transportation can contribute to public perception of GM plants/crops.

Most of the participants mentioned the relevance of radio talks shows or programs in sensitizing them about GM crops. Some of the key informants attributed their knowledge to the various training opportunities through farmer associations in Uganda (Mustefa et al., 2022).

Media can help through radio talk shows but also brochures should be made and distributed among the farmers associations the result of this study indicates that as mass media have its own contribution for public perception of GM plants, as the study shows (Iqbal, 2024). These associations have access to the farmers. These farmers will take it home read it over and over again may be the farmer will finally appreciate. Some areas are hard to reach and farmers have no radios. Timing the radio show when the farmer is back home might be a challenge and some places have difficulty with net works signal

The farmers, who need to grow GM plant/crops, may not get seeds on time, and too difficult to get GM plants seedlings result less profit, and most of GM plants/crops seedlings are not available probably because of high price

Most of the participants mentioned that they were more attached to the indigenous crop varieties. This has created a bias towards GM crops and the community is not willing to acquire more knowledge on them. But for the consumers and farmers it has been controversial. The public doesn't trust these genetically modified crops so they are very skeptical when one talks about GM. They prefer the traditional or original seeds, and they struggle to get our original food. This study shows slight similarity with the pervious study studied Addis Ababa (Admas, 2022)

Majority of people or farmers in the study area did not know the techniques of planting /how they plant genetically modified plant and harvest after GM plant fully grown. This problem restricts the farmers from growing GM crops. To overcome this problem, every stakeholder must have to learn the techniques of planting and the way how they harvest GM products

6. Conclusion and Recommendation

6.1 Conclusion

This thesis aimed to assess the level of public perception of GM plants. Based on a qualitative and quantitative analysis the result indicates that GM crops have high productivity due to their fast growing and maturation rate, and high yields. These benefits are key in enhancing food security especially for family and community with many dependents and small plots of land. Because, most of community members do not have adequate knowledge about GM crops, we can concluded that, there is need for sensitization on GM crops before their release to public, lack of knowledge is the main factors that results absence of awareness. Therefore, educating public in formal or informal education is important to build more aware citizen, not only this but, also giving information in order to eat, cultivate, sell, and buy the product of GM crops through different mass media (Radio, TV, news paper).we can say education is the key to build awareness level of community. This action increases their interest and make public to use GM plants, as well as increases their perception toward GM plants,

6.2 Recommendation

Public perception of genetically modified plants/crops is needed in our country, to increase food supply and to accelerate the economic growth of our country. So, it has high responsibility to achieve its objectives. Specifically public perception of genetically modified plants/crops will be effective, if it achieves the following action.

Telling the truth about GM plants to cultural, and religious leaders/persons, helps farmers in order to cultivate GM crops and giving enough information to cultural and religious leaders about use of GM crops in order to teach other individual so that this action makes and creates people to cultivate and use GM plant/crops

Encouraging those who need to cultivate genetically modified crops, this action will create farmers in order to cultivate more. teaching the people more about the advantage of cultivating and consuming genetically modified plants/crops, similarly it increases the awareness level of community about GM crops and will make the society starts to use GM crops

To develop public awareness about GM plant/crops, telling the advantage of growing GM plants/crops to person who need to grow GM plants/crops and telling advantage of consuming GM plants or crops through different mass media again and again, it helps to develop public awareness in the study area.

To develop peoples interest, or to make the people more interested to cultivate GM plants or crops, giving training, and indicating the benefit that we gain from GM plants or crop cultivation, is the best method to increase their interest.

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Appendices

Addis Ababa University College of Natural and Computational Science, Department of Zoological Science

Questionnaire on public perception of genetically modified plants/crops in Jimma zone, Dedo district.

Hello!! Dear participants, my name is AssegidAntaro, I am the data collector for this study. This questionnaire is prepared by AssegidAntaro, Biology teacher at Dedo high school to assess the study entitled above.

The aim of this study is to evaluate public perception of genetically modified plants in Jimma zone, Dedoweredda. your honesty will help us to get accurate information there is no name identified or anonymity will be kept and there will be no any visible risk with you and yourself as well as persons around you following your participation. There is no payment for your participation but I greatly thank for your involvement and you have the right to refuse from participation at any time.

Are you voluntary to participate in the study?

Yes, I have understood the above information and I am a volunteer to participate.

No, if you are not voluntary please stop here.

If you are voluntary to participate in the study; I kindly request you to provide your genuine response starting from the next page.

Thank you for your volunteer participation.

Appendix-One: Response Given By Farmers

Please answer the following questions by choosing from the given alternative.

1/ Sex; A/ Male B/ Female

2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.

3/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University

4/ What is your family job? A. Government employer. B. Private employer C. NGO
employer D. Day laborer E. Self employer F. Other

5/ Place of your family? A. Rural area B. Urban area

6/ Do you know what mean by genetically modified plants/crops? A/ Yes B/No.

7/Have you ever heard/knew about biotechnology products or transgenic plants?
A/ Yes B/ No

8/ Have you interested (farmers) to cultivate genetically modified plants, if you get the opportunity? A/Yes B/No

9/ How much is your concern about GM plants/crops? A/ Very low B/ Medium C/ High

10/ Do you follow agriculture related program in mass media, if you hire in which mass media? A/ through television B/ through radio C/ through magazine D/through Internet use E/ state if others

11/ Do you get enough information about GM plants/crops? A/ Yes B/ No
C/ some times

12/ Do you have interest to cultivate GM plants/crops? A/ Yes B/ No

13/ If your answer is no for question number 11, what is the reason behind?

14/ If your response is **yes** for question number is 11, what is the reason behind?
A/ To increase productivity B/ To increase income C/ To indicate others farmers the cultivation of GM crops E/State if you have other than the above reason-_____

15/ If your response is **no** for question no. 11, what is your reason A/ Lack of information B/ I hate to cultivate GM crops C/ The environment is not suitable to cultivate GM crops D/ Write your reason, if it is other than the above reason _____

16/ Do you tell the information you listen from mass media to your neighbors' farmers? A/ Yes I tell to them B/ sometimes C/ No, not at all D/ I tell to them in order to focus on GM crops rather than traditional farming

17/ whatfactors hinder you to cultivate GM plants/crops? A/religion B/ culture C/ traditional farming system and traditional crop (non modified) are enough to increase food supply D/ Lack of information's to cultivate E/ Lack of motivation to do F/ Absence of GM seed

Appendix-two: Response given by restaurant owner /traders

Part -1 - Please answers the following questions by choosing from the given alternative.

1/ Sex;

A/ Male

B/ Female

2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.

3/ what is your marital status? A/ Single (unmarried) B/ Married C/ Divorced D/ Widowed.

4/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University

5/ What is your family job? A/Government employed. B. Private employed C. NGO employer D. Day laborer E. Self employed F. Other

6/ Have you ever seen GM crops before? A/ Yes B/ No

7/ Do you know definition of GM plants/crops (meaning of GM crops) A/ Yes B/No

8/ Would you eat GM foods, if they were cheaper? A/ Will eat B/ Will not eat C/ Don't know

9/ What is your view of GM food in terms of consumption? A/ Harmful
B/ Not harmful C/ Not sure

10/ Do you trust the capacity of government agencies to handle GM food issues safely? A/ High trust B/ Low trust C/ Do not trust

11/What would you say about government funding of GM research? A/ Must be banned B/ Should be funded more C/ Not sure

12/ Have you ever seen GM crops in the market A/ Yes B/ No

13/ Have you interest to cultivate genetically modified plants, if you get the opportunity to cultivate GM crops? A. Yes B. No

14/ What is your interest on GM plants/crops A/ To see widely grown in Ethiopia B/ No interest C/ I do not want to see in my garden or farmland.

15/ Can you get GM Crops and their product easily in your local?. If your answer is no, state the reason A/ Yes B/ No

16/ What is your family attitude toward GM plants/crops A/ Negative B/ Positive C/ Neutral

Appendix-three: Response given by consumers.

Part-2- Please answer the following questions by choosing from the given alternative.

1/ Sex; A/ Male B/ Female

2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.

3/ what is your marital status? A/ Single (unmarried) B/ Married C/ Divorced D/ Windowed.

4/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University

5/ What is your family job? A/Government employed. B. Private employed C. NGO employer D. Day laborer E. Self employed F. Other

6/. Place of your family? A. Rural area B. Urban area

7/ Do you know the meaning of GM crops, and how they produced? A/ Yes B/No

8/ Are the consumers interested to use the GM crops? A / Yes B / No.
C/ Sometimes D/ Not at all

9/ Do you support or oppose GM food A/ Yes, I support B/ No, I didn't support C/ Neutral

10/ Have you ever heard about GM crops A/ Not at all B/ Sometime
C/I have heard repeatedly

11/ How do you describe GM plants/crops? A/ Have side effect
B/ No side effect C/ It is better than the organic one

12/ What is your perception about GM plants/crops?
as food or clothing A/ Safe with no problem
 B Dangerous as food or clothing C/ I have no idea

13/ Do you know the advantage that we gain from using GM plant? A/ Yes B/ No

Table-4.1.3 Personal information of consumers' respondents

Respo ndents	Sex	Age	Education level	Place of your family	Distance from the market	Job status
1	M	36	Grade-10 completed	Urban area	1 km	Self employed
2	M	38	University graduate	Urban area	2 km	Government employer
3	M	42	Grade-9 completed	Urban area	3 km	Government employer
4	M	45	Grade-6 completed	Urban area	2.5 km	Day laborer
5	M	40	Grade-7 completed	Urban area	3 km	Self employer
6	M	47	College graduated	urban area	2 km	Government employer
7	M	44	Grade-5 completed	Urban area	2.5 km	Government employed
8	F	28	College graduate	Urban area	1.3 km	Self employer
9	M	30	University graduate	urban area	0.5 km	Government employer
10	M	39	College graduate	urban area	0.5 km	Self employer
11	M	44	Grade 10 completed	Urban area	2 km	Self employer
12	M	46	Grade 9 completed	Urban area	1 km	Self employer
13	F	43	Grade 11 completed	Urban area	2.5 km	Government employer
14	M	48	Grade 6 completed	Urban area	2 km	Self employer
15	M	34	Collage graduate	Urban area	2 km	Self employer
16	M	43	Grade 8 completed	Urban area	1.5 km	Self employer
17	M	48	Grade 8 completed	Urban area	6 km	Merchant
18	M	49	University graduate	Urban area	1 km	Government employer

19	M	43	Grade completed	9	Urban area	1 km	Government employer
20	M	45	Grade completed	9	Urban area	2 km	Butcher
21	M	42	Collage graduate		Urban area	2 km	Government employer
22	M	46	Grade completed	10	Urban area	2 km	Government employer
23	M	41	Grade completed	12	Urban area	3 km	Car driver
24	M	55	Grade completed	4	Urban area	3 km	Farmer
25	M	50	Grade completed	5	Urban area	4 km	Self employer
26	M	41	Collage graduate		Urban area	2 km	Government employer
27	F	51	Grade completed	7	Urban area	4 km	Self employed
28	M	52	Grade completed	6	Urban area	4 km	Farmer
29	M	47	Grade completed	7	Urban area	4 km	Carpenter
30	F	54	Grade completed	5	Urban area	3 km	Self employed
31	M	53	Grade completed	6	Urban area	3 km	Merchant
32	M	38	University graduate		Urban area	3 km	Self employed
33	M	48	Grade completed	8	Urban area	4 km	Self employed
34	M	49	Grade completed	7	Urban area	2 km	Government employer
35	M	56	Collage graduate		Urban area	4 km	Self employed
36	M	35	Grade complete	6	Urban area	3 km	Self employed
37	M	43	Grade complete	8	Urban are	3 km	Self employed
38	M	37	Grade complete	11	Urban area	3 km	Government employed
39	M	48	Grade 8		Urban area	4 km	Carpenter
40	M	51	Grade 7		Urban area	3 km	Government

						employee
41	M	46	Grade 10	Urban area	4 km	Self employed
42	M	45	Grade 9	Urban area	4 km	Self employed
43	M	49	Grade 9	Urban area	2 km	Car driver
44	M	51	Grade 3	Rural area	5 km	Self employed
45	F	36	Collage graduate	Urban area	4 km	Merchant
46	M	42	University graduate	Urban area	3 km	Government employer
47	M	44	Grade 7	Urban area	5 km	Farmer
48	M	52	Grade 2	Rural area	6 km	Farmer
49	F	57	Grade 3	Urban area	3 km	Government employer
50	M	50	Grade 3	Urban area	3 km	Government employer
51	M	61	Uneducated	Urban area	5 km	Self employed
52	M	60	Grade 2	Urban area	4 km	Farmer
53	M	63	Grade 3	Urban area	5 km	Farmer
54	M	28	Collage complete	Urban area	4 km	Self employed
55	M	34	University graduate	Urban area	3 km	Self employed
56	M	38	Collage graduate	Urban area	4 km	Government employee
57	M	42	Grade 8	Rural area	5 km	Farmer
58	M	49	Grade 7	Rural area	5 km	Farmer
59	M	27	University graduate	Urban area	3 km	Government employee
60	M	25	College graduate	Urban area	3 km	Government employee
61	M	23	Grade 7	Urban area	5 km	Farmer
62	M	39	Grade 9	Urban area	5 km	Farmer
69	M	44	Grade 10	Urban area	4 km	Car driver
70	M	29	Collage graduate	Urban area	2 km	Merchant
75	M	27	College graduate	Urban area	3 km	Government employee
76	M	62	Grade 6	Rural area	5 km	Farmer

77	M	26	Grade 7	Rural area	5 km	Merchant
89	M	54	Grade 9	Urban area	3 km	Self employed
90	M	22	Grade 11	Urban area	4 km	Self employed
91	M	24	Grade 10	Urban area	4 km	Self employed
92	F	60	Grade 3	Urban area	3 km	Butcher
93	M	54	Grade 8	Urban area	5 km	Farmer
94	F	50	Grade 7	Urban are	3 km	Merchant
95	M	55	Grade 4	Urban area	6 km	Farmer
96	M	24	Grade 11	Urban area	6 km	Farmer
97	M	55	Grade 6	Urban area	5 km	Farmer
98	M	66	Grade 6	Urban area	5 km	Self employed
99	M	29	Grade 9	Urban area	4 km	Merchant
100	F	27	Collage graduate	Urban area	1 km	Government employee

Table-4.1.2 -Personal information of traders (restaurant owners) respondents

Respon dents	Sex	Age	Education level	Place family	of Distance from the market	Job status
1	M	36	Grade-10	Urban area	1 km	Hotel owner
2	M	38	Grade-8	Urban area	5 km	Hotel owner
3	M	42	Grade-4	Urban area	3 km	Hotel owner
4	M	45	Grade-1	Urban area	4.5 km	Hotel owner
5	M	40	Grade-5	Urban area	5.5 km	Hotel owner
6	M	43	Grade -10	urban area	5.5 km	Hotel owner
7	F	53	Grade-5	Urban area	2.5 km	Hotel owner
8	M	72	Grade-4	Urban area	4km	Hotel owner
9	F	37	Grade -9	urban area	4.5 km	Hotel owner
10	M	74	Uneducated	urban area	5km	Hotel owner
11	M	52	Grade -9	Rural area	6 km	Hotel owner and farmer
12	M	42	Grade -11	Urban area	1 km	Hotel owner, and farmer
13	M	51	Grade -8	Urban area	2 km	Hotel owner
14	F	55	Grade -7	Urban area	3 km	Hotel owner

15	M	50	Grade -7	Urban area	2km	Hotel owner
16	M	33	Grade -10	Urban area	2 km	Hotel owner
17	M	45	Grade -7	Urban area	3 km	Hotel owner, and farmer
18	M	46	Grade -10	Urban area	4 km	Hotel owner
19	M	49	Grade -11	Urban area	3 km	Hotel owner
20	F	52	Grade -6	Urban area	4 km	Hotel owner
21	M	43	Grade -8	Urban area	2 km	Hotel owner and farmer
22	F	46	Grade -7	Urban area	3 km	Hotel owner
23	F	55	Grade -5	Urban area	3 km	Hotel owner
24	M	59	Grade -3	Urban area	3 km	Hotel owner
25	F	55	Grade -4	Urban area	4 km	Hotel owner
26	F	52	Grade -6	Urban area	2 km	Hotel owner
27	F	49	Grade -5	Urban area	3 km	Hotel owner
28	M	47	Grade -11	Urban area	2 km	Hotel owner and farmer
29	F	53	Grade -6	Urban area	2 km	Hotel owner
30	F	36	Grade -8	Urban area	3 km	Hotel owner, and consumer
31	M	44	Grade -10	Urban area	4 km	Hotel owner and farmer
32	F	49	Grade -9	Urban area	2 km	Hotel owner
33	M	38	Grade -11	Urban area	3 km	Hotel owner and consumer
34	M	51	Grade -7	Urban area	3 km	Hotel owner
35	M	55	Grade -5	Urban area	4 km	Hotel owner and farmer
36	F	43	Grade 4	Urban area	3 km	Hotel owner and farmer
37	F	39	Grade 8	Urban area	3 km	Hotel owner and farmer
38	F	44	Grade 5	Urban area	3km	Hotel owner
39	F	42	Grade 5	Urban area	3 km	Hotel owner
40	M	51	Grade 3	Urban area	4 km	Hotel owner
41	F	43	Grade 2	Urban area	4 km	Hotel owner and farmer
42	F	46	Grade 4	Urban area	2 km	Hotel owner
43	F	35	Grade 7	Urban area	2 km	Hotel owner
44	M	52	Grade 5	Urban area	3 km	Hotel owner
45	M	38	Grade 11	Urban area	3 km	Hotel owner and merchant

46	M	39	Grade 12	Urban area	3 km	Hotel owner and farmer
47	F	44	Grade 9	Urban area	3 km	Hotel owner and farmer
48	M	52	Grade 6	Rural area	4 km	Hotel owner
49	F	48	Grade 7	Urban area	4 km	Hotel owner
50	F	55	Grade 5	Urban area	5 km	Hotel owner and merchant
51	M	44	Grade 8	Urban area	2 km	Hotel owner and merchant
52	M	36	Grade 9	Urban area	2 km	Hotel owner and merchant
53	M	39	Grade 10	Urban area	2 km	Hotel owner
54	M	49	Grade 8	Urban area	3 km	Hotel owner and merchant
55	M	46	Grade 6	Urban area	4km	Hotel owner
56	F	33	Grade 4	Urban area	3km	Hotel owner
57	F	34	Grade 5	Urban area	3km	Hotel owner
58	F	38	Uneducated	Urban area	3km	Hotel owner and merchant
59	M	42	Grade 5	Urban area	2km	Hotel owner and government employer
60	F	28	Grade 6	Urban area	3km	Hotel owner
61	M	39	Grade 8	Urban area	2 km	Hotel Servant
62	M	45	Grade 7	Urban area	1.5 km	Hotel Servant
63	F	43	Grade 9	Urban area	1 km	Hotel Servant
64	F	40	Grade 8	Urban area	0.5 km	Hotel Servant
65	F	38	Grade 10	Urban area	2.7 km	Hotel Servant
66	M	34	Grade 7	Urban area	5 km	Hotel owner
67	M	27	Grade 5	Urban area	4 km	Hotel owner
77	F	34	Grade 5	Urban area	3 km	Hotel owner
78	F	29	Grade 10	Urban area	3 km	Hotel owner
79	F	26	Grade 9	Urban area	2 km	Merchant and hotel owner
80	M	39	Grade 8	Urban area	4 km	Hotel owner
81	M	40	Grade 6	Urban area	5 km	Hotel owner
82	M	33	Grade 7	Urban area	5 km	Hotel owner
83	M	35	Grade 6	Urban area	3 km	Hotel owner and merchant
84	F	37	Grade 5	Urban area	4 km	Hotel owner
84	M	26	Grade 8	Urban area	3 km	Hotel owner

86	M	34	Grade 7	Urban area	4 km	Hotel owner and farmer
87	M	54	Grade 6	Urban area	5 km	Hotel owner
88	F	24	Grade 7	Urban area	5 km	Hotel owner and farmer
89	M	26	Grade 8	Urban area	4 km	Hotel owner
90	M	36	Grade 11	Urban area	3 km	Hotel owner
91	M	39	Uneducated	Urban area	4 km	Hotel owner and farmer
92	M	36	Grade 9	Urban area	3 km	Hotel owner
93	F	35	Grade 6	Urban area	3 km	Merchant and hotel owner
94	F	25	Grade 4	Urban area	3 km	Hotel owner
95	M	33	Grade 5	Urban area	5 km	Hotel owner
96	F	43	Grade 4	Urban area	5 km	Hotel owner and farmer
97	M	24	Grade 9	Urban area	3 km	Hotel owner
98	M	22	Grade 8	Urban area	3 km	Hotel owner
99	M	24	Grade 7	Urban area	4 km	Hotel owner
100	M	31	Grade 9	Urban area	3 km	Hotel owner and merchant

Table-4.1.1 - Personal information of farmers.

Resp onde nts	Sex	Age	Education level	Place of family	Distance from the market	Job status
1	M	36	Grade-7	Urban area	1 km	Farmer
2	M	38	Grade-5 complete	Rural area	5 km	Farmer
3	M	42	Grade-4 complete	Rural area	3 km	Farmer
4	M	45	Grade 5 complete	Rural area	4.5 km	Farmer
5	M	40	Grade-5 complete	Rural area	5.5 km	Farmer
6	M	67	Uneducated	Rural area	5.5 km	Farmer
7	M	53	Grade-3 complete	Rural area	2.5 km	Farmer
8	M	68	Grade-2 complete	Rural area	4km	Farmer

9	M	63	Uneducated	Rural area	4.5 km	Farmer
10	M	61	Uneducated	Rural area	5km	Farmer
11	M	36	Grade 12 complete	Urban area	500 m	Farmer and merchant
12	M	43	Grade 11 complete	Rural area	700 m	Farmer
13	M	52	Grade 4 complete	Rural area	6 km	Farmer
14	M	37	Grade-7 complete	Rural area	8 km	Farmer
15	M	47	Grade -6 complete	Rural area	5 km	Farmer
16	M	46	Grade -5 complete	Rural area	9 km	Farmer
17	M	38	Grade -7 complete	Rural area	7 km	Farmer
18	M	48	Grade-5 complete	Rural area	10 km	Farmer
19	M	67	Uneducated	Rural area		Farmer
20	M	35	Grade-10 complete	Urban area	2 km	Farmer and hotel owner
21	M	33	Grade-7 complete	Rural area	5 km	Farmer
22	M	54	Grade-3 complete	Rural area	7 km	Farmer
23	M	52	Grade -2 complete	Rural area	9 km	Farmer
24	M	67	Uneducated	Rural area	10 km	Farmer
25	M	47	Grade -3 complete	Rural area	8 km	Farmer
26	M	55	Grade -5 complete	Rural area	6 km	Farmer
27	M	54	Grade -5 complete	Rural area	7 km	Farmer
28	M	53	Grade -6 complete	Rural area	8 km	Farmer
29	M	56	Grade -4 complete	Rural area	10 km	Farmer
30	M	61	Grade -2 complete	Rural area	8 km	Farmer
31	M	60	Grade -1 complete	Rural area	4 km	Farmer

32	M	45	Grade -3 complete	Rural area	7 km	Farmer
33	M	43	Grade -4 complete	Rural area	9 km	Farmer
34	M	47	Grade -2 complete	Rural area	3 km	Farmer
35	M	50	Uneducated	Rural area	6 km	Farmer
36	M	58	Uneducated	Rural area	5 km	Farmer
37	M	57	Grade 3 complete	Rural area	5 km	Farmer
38	M	43	Grade 4	Rural area	2 km	Merchant and farmer
39	M	55	Grade 3	Rural are	5 km	Farmer
40	M	34	Grade 9	Rural area	3 km	Farmer
41	M	36	Grade 11	Rural area	3 km	Merchant and farmer
42	M	32	Grade 10	Rural area	6 km	Farmer
43	M	44	Grade 6	Rural area	6 km	Farmer
44	M	42	Grade 7 complete c	Rural area	5 km	Farmer
45	M	48	Grade 5 complete	Rural area	4 km	Farmer
46	M	47	Grade 8 complete	Rural area	5 km	Farmer
47	M	35	Grade 8 complete	Urbana area	1km	Merchant and farmer
48	M	31	Grade 9 complete	Rural area	5 km	Farmer
49	M	65	Grade 3 complete	Rural area	4 km	Farmer
50	M	62	Uneducated	Rural area	5 km	Farmer
51	M	56	Grade 4 complete	Rural area	4 km	Farmer
52	M	44	Grade 9 complete	Rural area	3 km	Farmer
53	M	33	Grade 12 complete	Urban area	2 km	Merchant and farmer
54	M	43	Grade 8 complete	Urban area	3 km	Merchant and farmer
55	M	51	Grade 8 complete	Rural area	4 km	Farmer
56	M	54	Grade 7	Urban area	5 km	Farmer

			complete			
57	M	47	Grade 5 complete	Urban area	5 km	Merchant and farmer
58	M	54	Grade 6 complete	Rural area	6 km	Farmer
59	F	49	Grade 3 complete	Rural area	3 km	Farmer
60	M	52	Grade 2 complete	Urban are	3 km	Merchant and farmer
61	M	57	Grade 4 complete	Rural are	5 km	Farmer
62	M	31	Collage graduate	Rural area	2 km	Government employer
63	M	65	Grade 4 complete	Rural area	6 km	Farmer
65	M	66	Uneducated	Rural area	6 km	Farmer
66	M	55	Grade 5 complete	Rural area	6 km	Farmer
68	M	50	Grade 4 complete	Rural area	5 km	Farmer
69	M	47	Grade 7 complete	Rural area	5 km	Farmer
70	M	55	Grade 6 complete	Rural area	5 km	Farmer
71	M	37	Grade 12 complete	Urban area	5 km	Farmer
72	M	30	Grade 10 complete	Urban area	4 km	Farmer
73	F	33	Grade 11 complete	Urban area	4 km	Farmer
74	F	36	Grade 9 complete	Rural area	2 km	Farmer and. Employer
75	M	43	Grade 7	Rural area	4 km	Farmer
76	M	29	Grade11 complete	Urban area	2 km	Merchant and farmer
77	F	30	Grade 9 complete	Rural area	3 km	Merchant and farmer
78	M	30	Grade complete	Urban area	3 km	Farmer
80	M	48	Grade 5 complete	Urban area	4 km	Farmer
81	M	47	Grade 7	Urban area	3 km	Hotel servant

			complete			and farmer
82	M	55	Grade 8 complete	Rural area	6 km	Farmer
83	M	52	Grade 6 complete	Rural area	6 km	Farmer
84	F	34	Grade 9 complete	Urban area	3km	Merchant and farmer
85	M	39	Grade 11 complete	Urban area	5km	Farmer
86	M	44	Grade 9 complete	Urban area	5km	Farmer
87	M	59	Grade 6 complete	Urban area	5km	Farmer
88	M	62	Grade 2 complete	Rural area	6km	Farmer
89	M	44	Grade 7 complete	Urban area	6km	Farmer
90	F	29	Grade 9 complete	Urban area	4km	Merchant and farmer
91	M	38	Grade 8 complete	Urban area	4km	Farmer
92	M	39	Grade 9 complete	Urban area	4km	Farmer
93	M	49	Grade 8 complete	Urban area	4km	Farmer
94	M	35	Grade 9 complete	Urban area	3km	Farmer
95	M	38	Grade 7 complete	Rural area	4km	Farmer
96	M	55	Grade 6 complete	Rural area	5km	Farmer
97	M	54	Grade 4 complete	Rural area	5km	Farmer
98	M	29	Grade 10 complete	Urban area	6km	Farmer
99	M	42	Grade 8 complete	Rural area	6km	Farmer
100	F	32	Grade 11 complete	Urban area	3km	Hotel owner and farmer

Table-4.1.3 Personal information of consumers' respondents

Re sp on de nt s	S e x	Ag e	Educat ion level	Place of your family	Distance from the market	Job status
1	M	36	Grade-10 comple ted	Urban area	1 km	Self employ ed
2	M	38	Univer sity gradua te	Urban area	2 km	Govern ment employ er
3	M	42	Grade-9 comple ted	Urban area	3 km	Govern ment employ er
4	M	45	Grade-6 comple ted	Urban area	2.5 km	Day laborer
5	M	40	Grade-7 comple ted	Urban area	3 km	Self employ er
6	M	47	College gradua ted	urban area	2 km	Govern ment employ er
7	M	44	Grade-5 comple ted	Urban area	2.5 km	Govern ment employ ed
8	F	28	College gradua te	Urban area	1.3 km	Self employ er

9	M	30	Univer sity gradua te	urban area	0.5 km	Govern ment employ er
10	M	39	College gradua te	urban area	0.5 km	Self employ er
11	M	44	Grade 10 comple ted	Urban area	2 km	Self employ er
12	M	46	Grade 9 comple ted	Urban area	1 km	Self employ er
13	F	43	Grade 11 comple ted	Urban area	2.5 km	Govern ment employ er
14	M	48	Grade 6 comple ted	Urban area	2 km	Self employ er
15	M	34	Collage gradua te	Urban area	2 km	Self employ er
16	M	43	Grade 8 comple ted	Urban area	1.5 km	Self employ er
17	M	48	Grade 8 comple ted	Urban area	6 km	Mercha nt
18	M	49	Univer sity gradua te	Urban area	1 km	Govern ment employ er
19	M	43	Grade 9 comple ted	Urban area	1 km	Govern ment employ er

20	M	45	Grade 9 completed	Urban area	2 km	Butcher
21	M	42	Collage graduate	Urban area	2 km	Government employer
22	M	46	Grade 10 completed	Urban area	2 km	Government employer
23	M	41	Grade 12 completed	Urban area	3 km	Car driver
24	M	55	Grade 4 completed	Urban area	3 km	Farmer
25	M	50	Grade 5 completed	Urban area	4 km	Self employer
26	M	41	Collage graduate	Urban area	2 km	Government employer
27	F	51	Grade 7 completed	Urban area	4 km	Self employed
28	M	52	Grade 6 completed	Urban area	4 km	Farmer
29	M	47	Grade 7 completed	Urban area	4 km	Carpenter
30	F	54	Grade 5	Urban area	3 km	Self employ

			comple ted			ed
31	M	53	Grade 6 comple ted	Urban area	3 km	Mercha nt
32	M	38	Univer sity gradua te	Urban area	3 km	Self employ ed
33	M	48	Grade 8 comple ted	Urban area	4 km	Self employ ed
34	M	49	Grade 7 comple ted	Urban area	2 km	Govern ment employ er
35	M	56	Collage gradua te	Urban area	4 km	Self employ ed
36	M	35	Grade 6 comple te	Urban area	3 km	Self employ ed
37	M	43	Grade 8 comple te	Urban are	3 km	Self employ ed
38	M	37	Grade 11 comple te	Urban area	3 km	Govern ment employ ed
39	M	48	Grade 8	Urban area	4 km	Carpent er
40	M	51	Grade 7	Urban area	3 km	Govern ment employ ee
41	M	46	Grade 10	Urban area	4 km	Self employ ed

42	M	45	Grade 9	Urban area	4 km	Self employ ed
43	M	49	Grade 9	Urban area	2 km	Car driver
44	M	51	Grade 3	Rural area	5 km	Self employ ed
45	F	36	Collage gradua te	Urban area	4 km	Mercha nt
46	M	42	Univer sity gradua te	Urban area	3 km	Govern ment employ er
47	M	44	Grade 7	Urban area	5 km	Farmer
48	M	52	Grade 2	Rural area	6 km	Farmer
49	F	57	Grade 3	Urban area	3 km	Govern ment employ er
50	M	50	Grade 3	Urban area	3 km	Govern ment employ er
51	M	61	Unedu cated	Urban area	5 km	Self employ ed
52	M	60	Grade 2	Urban area	4 km	Farmer
53	M	63	Grade 3	Urban area	5 km	Farmer
54	M	28	Collage comple te	Urban area	4 km	Self employ ed
55	M	34	Univer sity gradua te	Urban area	3 km	Self employ ed
56	M	38	Collage	Urban	4 km	Govern

			graduate	area		ment employ ee
57	M	42	Grade 8	Rural area	5 km	Farmer
58	M	49	Grade 7	Rural area	5 km	Farmer
59	M	27	Univer sity gradua te	Urban area	3 km	Govern ment employ ee
60	M	25	College gradua te	Urban area	3 km	Govern ment employ ee
61	M	23	Grade 7	Urban area	5 km	Farmer
62	M	39	Grade 9	Urban area	5 km	Farmer
69	M	44	Grade 10	Urban area	4 km	Car driver
70	M	29	Collage gradua te	Urban area	2 km	Mercha nt
75	M	27	College gradua te	Urban area	3 km	Govern ment employ ee
76	M	62	Grade 6	Rural area	5 km	Farmer
77	M	26	Grade 7	Rural area	5 km	Mercha nt
89	M	54	Grade 9	Urban area	3 km	Self employ ed
90	M	22	Grade 11	Urban area	4 km	Self employ ed
91	M	24	Grade 10	Urban area	4 km	Self employ ed
92	F	60	Grade	Urban	3 km	Butcher

			3	area		
93	M	54	Grade 8	Urban area	5 km	Farmer
94	F	50	Grade 7	Urban area	3 km	Merchant
95	M	55	Grade 4	Urban area	6 km	Farmer
96	M	24	Grade 11	Urban area	6 km	Farmer
97	M	55	Grade 6	Urban area	5 km	Farmer
98	M	66	Grade 6	Urban area	5 km	Self employed
99	M	29	Grade 9	Urban area	4 km	Merchant
100	F	27	Collage graduate	Urban area	1 km	Government employee

Table-4.1.2 -Personal information of traders (restaurant owners) respondents

Respondents	Sex	Age	Education level	Place of family	Distance from the market	Job status
1	M	36	Grade-10	Urban area	1 km	Hotel owner
2	M	38	Grade-8	Urban area	5 km	Hotel owner
3	M	42	Grade-4	Urban area	3 km	Hotel owner
4	M	45	Grade-1	Urban area	4.5 km	Hotel owner
5	M	40	Grade-5	Urban area	5.5 km	Hotel owner
6	M	43	Grade -10	urban area	5.5 km	Hotel owner
7	F	53	Grade-5	Urban area	2.5 km	Hotel owner
8	M	72	Grade-4	Urban area	4km	Hotel owner
9	F	37	Grade -9	urban area	4.5 km	Hotel owner
10	M	74	Uneducated	urban area	5km	Hotel owner
11	M	52	Grade -9	Rural area	6 km	Hotel owner and farmer
12	M	42	Grade -11	Urban area	1 km	Hotel owner, and farmer

13	M	51	Grade -8	Urban area	2 km	Hotel owner
14	F	55	Grade -7	Urban area	3 km	Hotel owner
15	M	50	Grade -7	Urban area	2km	Hotel owner
16	M	33	Grade -10	Urban area	2 km	Hotel owner
17	M	45	Grade -7	Urban area	3 km	Hotel owner, and farmer
18	M	46	Grade -10	Urban area	4 km	Hotel owner
19	M	49	Grade -11	Urban area	3 km	Hotel owner
20	F	52	Grade -6	Urban area	4 km	Hotel owner
21	M	43	Grade -8	Urban area	2 km	Hotel owner and farmer
22	F	46	Grade -7	Urban area	3 km	Hotel owner
23	F	55	Grade -5	Urban area	3 km	Hotel owner
24	M	59	Grade -3	Urban area	3 km	Hotel owner
25	F	55	Grade -4	Urban area	4 km	Hotel owner
26	F	52	Grade -6	Urban area	2 km	Hotel owner
27	F	49	Grade -5	Urban area	3 km	Hotel owner
28	M	47	Grade -11	Urban area	2 km	Hotel owner and farmer
29	F	53	Grade -6	Urban area	2 km	Hotel owner
30	F	36	Grade -8	Urban area	3 km	Hotel owner, and consumer
31	M	44	Grade -10	Urban area	4 km	Hotel owner and farmer
32	F	49	Grade -9	Urban area	2 km	Hotel owner
33	M	38	Grade -11	Urban area	3 km	Hotel owner and consumer
34	M	51	Grade -7	Urban area	3 km	Hotel owner
35	M	55	Grade -5	Urban area	4 km	Hotel owner and farmer
36	F	43	Grade 4	Urban area	3 km	Hotel owner and farmer
37	F	39	Grade 8	Urban area	3 km	Hotel owner and farmer
38	F	44	Grade 5	Urban area	3km	Hotel owner
39	F	42	Grade 5	Urban area	3 km	Hotel owner
40	M	51	Grade 3	Urban area	4 km	Hotel owner
41	F	43	Grade 2	Urban area	4 km	Hotel owner and farmer
42	F	46	Grade 4	Urban area	2 km	Hotel owner
43	F	35	Grade 7	Urban area	2 km	Hotel owner
44	M	52	Grade 5	Urban area	3 km	Hotel owner

45	M	38	Grade 11	Urban area	3 km	Hotel owner and merchant
46	M	39	Grade 12	Urban area	3 km	Hotel owner and farmer
47	F	44	Grade 9	Urban area	3 km	Hotel owner and farmer
48	M	52	Grade 6	Rural area	4 km	Hotel owner
49	F	48	Grade 7	Urban area	4 km	Hotel owner
50	F	55	Grade 5	Urban area	5 km	Hotel owner and merchant
51	M	44	Grade 8	Urban area	2 km	Hotel owner and merchant
52	M	36	Grade 9	Urban area	2 km	Hotel owner and merchant
53	M	39	Grade 10	Urban area	2 km	Hotel owner
54	M	49	Grade 8	Urban area	3 km	Hotel owner and merchant
55	M	46	Grade 6	Urban area	4km	Hotel owner
56	F	33	Grade 4	Urban area	3km	Hotel owner
57	F	34	Grade 5	Urban area	3km	Hotel owner
58	F	38	Uneducated	Urban area	3km	Hotel owner and merchant
59	M	42	Grade 5	Urban area	2km	Hotel owner and government employer
60	F	28	Grade 6	Urban area	3km	Hotel owner
61	M	39	Grade 8	Urban area	2 km	Hotel Servant
62	M	45	Grade 7	Urban area	1.5 km	Hotel Servant
63	F	43	Grade 9	Urban area	1 km	Hotel Servant
64	F	40	Grade 8	Urban area	0.5 km	Hotel Servant
65	F	38	Grade 10	Urban area	2.7 km	Hotel Servant
66	M	34	Grade 7	Urban area	5 km	Hotel owner
67	M	27	Grade 5	Urban area	4 km	Hotel owner
77	F	34	Grade 5	Urban area	3 km	Hotel owner
78	F	29	Grade 10	Urban area	3 km	Hotel owner
79	F	26	Grade 9	Urban area	2 km	Merchant and hotel owner
80	M	39	Grade 8	Urban area	4 km	Hotel owner
81	M	40	Grade 6	Urban area	5 km	Hotel owner
82	M	33	Grade 7	Urban area	5 km	Hotel owner
83	M	35	Grade 6	Urban area	3 km	Hotel owner and merchant

84	F	37	Grade 5	Urban area	4 km	Hotel owner
84	M	26	Grade 8	Urban area	3 km	Hotel owner
86	M	34	Grade 7	Urban area	4 km	Hotel owner and farmer
87	M	54	Grade 6	Urban area	5 km	Hotel owner
88	F	24	Grade 7	Urban area	5 km	Hotel owner and farmer
89	M	26	Grade 8	Urban area	4 km	Hotel owner
90	M	36	Grade 11	Urban area	3 km	Hotel owner
91	M	39	Uneducated	Urban area	4 km	Hotel owner and farmer
92	M	36	Grade 9	Urban area	3 km	Hotel owner
93	F	35	Grade 6	Urban area	3 km	Merchant and hotel owner
94	F	25	Grade 4	Urban area	3 km	Hotel owner
95	M	33	Grade 5	Urban area	5 km	Hotel owner
96	F	43	Grade 4	Urban area	5 km	Hotel owner and farmer
97	M	24	Grade 9	Urban area	3 km	Hotel owner
98	M	22	Grade 8	Urban area	3 km	Hotel owner
99	M	24	Grade 7	Urban area	4 km	Hotel owner
100	M	31	Grade 9	Urban area	3 km	Hotel owner and merchant

Table-4.1.1 - Personal information of farmers.

R e s p o n d e n t s	S e x	A g e	Educat ion level	Place of family	Distance from the market	Job status
1	M	36	Grade-7	Urban area	1 km	Farmer
2	M	38	Grade-5	Rural area	5 km	Farmer

			comple te			
3	M	4 2	Grade- 4 comple te	Rural area	3 km	Farmer
4	M	4 5	Grade 5 comple te	Rural area	4.5 km	Farmer
5	M	4 0	Grade- 5 comple te	Rural area	5.5 km	Farmer
6	M	6 7	Unedu cated	Rural area	5.5 km	Farmer
7	M	5 3	Grade- 3 comple te	Rural area	2.5 km	Farmer
8	M	6 8	Grade- 2 comple te	Rural area	4km	Farmer
9	M	6 3	Unedu cated	Rural area	4.5 km	Farmer
1 0	M	6 1	Unedu cated	Rural area	5km	Farmer
1 1	M	3 6	Grade 12 comple te	Urban area	500 m	Farmer and merchant
1 2	M	4 3	Grade 11 comple te	Rural area	700 m	Farmer
1 3	M	5 2	Grade 4 comple te	Rural area	6 km	Farmer
1 4	M	3 7	Grade- 7	Rural area	8 km	Farmer

			comple te			
1 5	M	4 7	Grade - 6 comple te	Rural area	5 km	Farmer
1 6	M	4 6	Grade - 5 comple te	Rural area	9 km	Farmer
1 7	M	3 8	Grade - 7 comple te	Rural area	7 km	Farmer
1 8	M	4 8	Grade- 5 comple te	Rural area	10 km	Farmer
1 9	M	6 7	Unedu cated	Rural area		Farmer
2 0	M	3 5	Grade- 10 comple te	Urban area	2 km	Farmer and hotel owner
2 1	M	3 3	Grade- 7 comple te	Rural area	5 km	Farmer
2 2	M	5 4	Grade- 3 comple te	Rural area	7 km	Farmer
2 3	M	5 2	Grade - 2 comple te	Rural area	9 km	Farmer
2 4	M	6 7	Unedu cated	Rural area	10 km	Farmer
2 5	M	4 7	Grade - 3 comple te	Rural area	8 km	Farmer

26	M	55	Grade - 5 complete	Rural area	6 km	Farmer
27	M	54	Grade - 5 complete	Rural area	7 km	Farmer
28	M	53	Grade - 6 complete	Rural area	8 km	Farmer
29	M	56	Grade - 4 complete	Rural area	10 km	Farmer
30	M	61	Grade - 2 complete	Rural area	8 km	Farmer
31	M	60	Grade - 1 complete	Rural area	4 km	Farmer
32	M	45	Grade - 3 complete	Rural area	7 km	Farmer
33	M	43	Grade - 4 complete	Rural area	9 km	Farmer
34	M	47	Grade - 2 complete	Rural area	3 km	Farmer
35	M	50	Uneducated	Rural area	6 km	Farmer
36	M	58	Uneducated	Rural area	5 km	Farmer
37	M	57	Grade 3 complete	Rural area	5 km	Farmer

			te			
38	M	43	Grade 4	Rural area	2 km	Merchant and farmer
39	M	55	Grade 3	Rural area	5 km	Farmer
40	M	34	Grade 9	Rural area	3 km	Farmer
41	M	36	Grade 11	Rural area	3 km	Merchant and farmer
42	M	32	Grade 10	Rural area	6 km	Farmer
43	M	44	Grade 6	Rural area	6 km	Farmer
44	M	42	Grade 7 complete c	Rural area	5 km	Farmer
45	M	48	Grade 5 complete	Rural area	4 km	Farmer
46	M	47	Grade 8 complete	Rural area	5 km	Farmer
47	M	35	Grade 8 complete	Urbana area	1km	Merchant and farmer
48	M	31	Grade 9 complete	Rural area	5 km	Farmer
49	M	65	Grade 3 complete	Rural area	4 km	Farmer
50	M	62	Uneducated	Rural area	5 km	Farmer
51	M	56	Grade 4 comple	Rural area	4 km	Farmer

			te			
5 2	M	4 4	Grade 9 comple te	Rural area	3 km	Farmer
5 3	M	3 3	Grade 12 comple te	Urban area	2 km	Merchant and farmer
5 4	M	4 3	Grade 8 comple te	Urban area	3 km	Merchant and farmer
5 5	M	5 1	Grade 8 comple te	Rural area	4 km	Farmer
5 6	M	5 4	Grade 7 comple te	Urban area	5 km	Farmer
5 7	M	4 7	Grade 5 comple te	Urban area	5 km	Merchant and farmer
5 8	M	5 4	Grade 6 comple te	Rural area	6 km	Farmer
5 9	F	4 9	Grade 3 comple te	Rural area	3 km	Farmer
6 0	M	5 2	Grade 2 comple te	Urban are	3 km	Merchant and farmer
6 1	M	5 7	Grade 4 comple te	Rural are	5 km	Farmer
6	M	3	Collage	Rural	2 km	Government

2		1	gradua te	area		employer
6 3	M	6 5	Grade 4 comple te	Rural area	6 km	Farmer
6 5	M	6 6	Unedu cated	Rural area	6 km	Farmer
6 6	M	5 5	Grade 5 comple te	Rural area	6 km	Farmer
6 8	M	5 0	Grade 4 comple te	Rural area	5 km	Farmer
6 9	M	4 7	Grade 7 comple te	Rural area	5 km	Farmer
7 0	M	5 5	Grade 6 comple te	Rural area	5 km	Farmer
7 1	M	3 7	Grade 12 comple te	Urban area	5 km	Farmer
7 2	M	3 0	Grade 10 comple te	Urban area	4 km	Farmer
7 3	F	3 3	Grade 11 comple te	Urban area	4 km	Farmer
7 4	F	3 6	Grade 9 comple te	Rural area	2 km	Farmer and. Employer
7 5	M	4 3	Grade 7	Rural area	4 km	Farmer

7 6	M	2 9	Grade1 1 comple te	Urban area	2 km	Merchant and farmer
7 7	F	3 0	Grade 9 comple te	Rural area	3 km	Merchant and farmer
7 8	M	3 0	Grade comple te	Urban area	3 km	Farmer
8 0	M	4 8	Grade 5 comple te	Urban area	4 km	Farmer
8 1	M	4 7	Grade 7 comple te	Urban area	3 km	Hotel servant and farmer
8 2	M	5 5	Grade 8 comple te	Rural area	6 km	Farmer
8 3	M	5 2	Grade 6 comple te	Rural area	6 km	Farmer
8 4	F	3 4	Grade 9 comple te	Urban area	3km	Merchant and farmer
8 5	M	3 9	Grade 11 comple te	Urban area	5km	Farmer
8 6	M	4 4	Grade 9 comple te	Urban area	5km	Farmer
8 7	M	5 9	Grade 6 comple	Urban area	5km	Farmer

			te			
88	M	62	Grade 2 complete	Rural area	6km	Farmer
89	M	44	Grade 7 complete	Urban area	6km	Farmer
90	F	29	Grade 9 complete	Urban area	4km	Merchant and farmer
91	M	38	Grade 8 complete	Urban area	4km	Farmer
92	M	39	Grade 9 complete	Urban area	4km	Farmer
93	M	49	Grade 8 complete	Urban area	4km	Farmer
94	M	35	Grade 9 complete	Urban area	3km	Farmer
95	M	38	Grade 7 complete	Rural area	4km	Farmer
96	M	55	Grade 6 complete	Rural area	5km	Farmer
97	M	54	Grade 4 complete	Rural area	5km	Farmer
9	M	2	Grade	Urban	6km	Farmer

8		9	10 comple te	area		
9 9	M	4 2	Grade 8 comple te	Rural area	6km	Farmer
1 0 0	F	3 2	Grade 11 comple te	Urban area	3km	Hotel owner and farmer

Appendices

Addis Ababa University College of Natural and Computational Science, Department of Zoological Science

Questionnaire on public perception of genetically modified plants/crops in Jimma zone, Dedo district.

Hello!! Dear participants, my name is Assegid Antaro, I am the data collector for this study. This questionnaire is prepared by Assegid Antaro, Biology teacher at Dedo high school to assess the study entitled above.

The aim of this study is to evaluate public perception of genetically modified plants in Jimma zone, Dedo wereda. your honesty will help us to get accurate information there is no name identified or anonymity will be kept and there will be no any visible risk with you and yourself as well as persons around you following your participation. There is no payment for your participation but I greatly thank for your involvement and you have the right to refuse from participation at any time.

Are you voluntary to participate in the study?

Yes, I have understood the above information and I am a volunteer to participate.

No, if you are not voluntary please stop here.

If you are voluntary to participate in the study; I kindly request you to provide your genuine response starting from the next page.

Thank you for your volunteer participation.

Appendix-One: Response Given By Farmers

Please answer the following questions by choosing from the given alternative.

- 1/ Sex; A/ Male B/ Female
- 2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.
- 3/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University
- 4/ What is your family job? A. Government employer. B. Private employer
C. NGO employer D. Day laborer E. Self employer F. Other
- 5/ Place of your family? A. Rural area B. Urban area
- 6/ Do you know what mean by genetically modified plants/crops? A/ Yes B/No.
- 7/Have you ever heard/knew about biotechnology products or transgenic plants? A/ Yes B/ No
- 8/ Have you interested (farmers) to cultivate genetically modified plants, if you get the opportunity? A/Yes B/No
- 10/ How much is your concern about GM plants/crops? A/ Very low B/
Medium C/ High
- 11/ Do you follow agriculture related program in mass media, if you hire in which mass media? A/ through television B/ through radio C/ through magazine
D/ through Internet use E/ state if others
- 12/ Do you get enough information about GM plants/crops? A/ Yes B/ No
C/ some times

13/ Do you have interest to cultivate GM plants/crops? A/ Yes B/ No

14/ If your answer is no for question number 11, what is the reason behind?

15/ If your response is **yes** for question number is 11, what is the reason behind?
A/ To increase productivity B/ To increase income C/ To indicate others farmers the cultivation of GM crops E/State if you have other than the above reason - _____

16/ If your response is **no** for question no. 11, what is your reason A/ Lack of information B/ I hate to cultivate GM crops C/ The environment is not suitable to cultivate GM crops D/ Write your reason, if it is other than the above reason _____

17/ Do you tell the information you listen from mass media to your neighbors' farmers? A/ Yes I tell to them B/ sometimes C/ No, not at all D/ I tell to them in order to focus on GM crops rather than traditional farming

18/ what factors hinder you to cultivate GM plants/crops? A/ religion
B/ culture C/ traditional farming system and traditional crop (non modified) are enough to increase food supply D/ Lack of information's to cultivate E/ Lack of motivation to do F/ Absence of GM seed

Appendix-two: Response given by restaurant owner /traders

Part -1 - Please answers the following questions by choosing from the given alternative.

- 1/ Sex; A/ Male B/ Female
- 2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.
- 3/ what is your marital status? A/ Single (unmarried) B/ Married C/ Divorced D/ Windowed.
- 4/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University
- 5/ What is your family job? A/Government employed. B. Private employed C. NGO
employer D. Day laborer E. Self employed F. Other
- 6/ Have you ever seen GM crops before? A/ Yes B/ No
- 7/ Do you know definition of GM plants/crops (meaning of GM crops) A/ Yes B/No
- 8/ Would you eat GM foods, if they were cheaper? A/ Will eat B/ Will
not eat C/ Don't know
- 9/ What is your view of GM food in terms of consumption? A/ Harmful
B/ Not harmful C/ Not sure
- 10/ Do you trust the capacity of government agencies to handle GM food issues
safely? A/ High trust B/ Low trust C/ Do not trust
- 11/What would you say about government funding of GM research? A/ Must be
banned B/ Should be funded more C/ Not sure

12/ Have you ever seen GM crops in the market A/ Yes B/ No

13/ Have you interest to cultivate genetically modified plants, if you get the opportunity to cultivate GM crops? A. Yes B. No

14/ What is your interest on GM plants/crops A/ To see widely grown in Ethiopia B/ No interest C/ I do not want to see in my garden or farmland.

15/ Can you get GM Crops and their product easily in your local?. If your answer is no, state the reason A/ Yes B/ No

16/ What is your family attitude toward GM plants/crops A/ Negative B/ Positive
C/ Neutral

Appendix-three: Response given by consumers.

Part-2- Please answer the following questions by choosing from the given alternative.

- 1/ Sex; A/ Male B/ Female
- 2/ Age; A/ From 10---18 B/ From 19--40 C/ From 41----60 D/ 61--70 E/ 71--80.
- 3/ what is your marital status? A/ Single (unmarried) B/ Married C/ Divorced D/ Windowed.
- 4/What is the last year or grade of school you completed? A/ Grade 1-3 B/ Grade 4-6
C/Grade 7-10 D/ Grade 9-12 E/ College F/ University
- 5/ What is your family job? A/Government employed. B. Private employed C. NGO employer D. Day laborer E. Self employed F. Other
- 6/. Place of your family? A. Rural area B. Urban area
- 7/ Do you know the meaning of GM crops, and how they produced? A/ Yes B/No
- 8/ Do you know food derived from GM crops A/ Yes B/ No**
- 9/ Are the consumers interested to use the GM crops? A / Yes B / No.
C/ Sometimes D/ Not at all
- 10/ Do you know what mean by GM plants/crops? A/ Yes B/N.
- 11/ Do you support or oppose GM food A/ Yes, I support B/ No, I didn't support
 C/ Neutral
- 12/ Have you ever heard about GM crops A/ Not at all B/ Sometime
C/I have heard repeatedly
- 13/ How do you describe GM plants/crops? A/ Have side effect
B/ No side effect C/ It is better than the organic one

14/ What is your perception about GM plants/crops? A/ Safe with no problem
as food or clothing B Dangerous as food or clothing C/ I have no idea

15/ Do you know the advantage that we gain from using GM plant? A/ Yes B/ No