



MONITORING AND EVALUATION OF THE LOCAL TECHNICAL AGROCLIMATIC COMMITTEES (MTA) IN GUATEMALA - 2022

Report prepared by the International Center for Tropical Agriculture (CIAT)
Dec 2022

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Citation

Hernández-Quevedo, M, et al. 2022. Monitoring and evaluation of Local Technical Agroclimatic Committees (MTA) in Guatemala - 2022. The Alliance of Bioversity International and CIAT. Rome, Italy.

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Monitoring and evaluation of the Local Technical Agroclimatic Committees (MTA) in Guatemala - 2022

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Acknowledgments

This working paper, which presents the application of a monitoring and evaluation instrument to analyze the scope, effectiveness, perception, and relevance of the Local Technical Agroclimatic Committees (MTA, initials in Spanish) in Guatemala, was developed as part of the [CGIAR](#) initiatives *Building Systemic Resilience Against Climate Variability and Extremes (Climate Resilient)*, *Resilient Agrifood Innovation Systems Driving Food Security, Inclusive Growth, and Reduced Out-Migration in Latin America and the Caribbean (AgriLAC Resiliente)* and *Livestock, Climate, and System Resilience (Livestock and Climate)* and is supported by contributors to the [CGIAR Trust Fund](#). CGIAR is a global research association for a food secure future dedicated to transforming food, land and water systems in a climate crisis.

The authors thank the team from the Department of Research and Climate Services of the National Institute of Seismology, Volcanology, Meteorology and Hydrology (INSIVUMEH), the teams from the Climate Change Unit (UCC) and the Directorate of Geographic, Strategic Information and Management of Risks (DIGEGR) of the Ministry of Agriculture, Livestock and Food (MAGA), for their active participation in the promotion, establishment, scaling and/or monitoring of the Local Technical Agroclimatic Committees of Guatemala. We also thank the monitoring and evaluation teams of the International Research Institute for Climate and Society (IRI) and The Alliance of Bioversity International - CIAT for their contributions in the preparation of the instrument used in this document.

This publication has not been subject to the standard peer review procedures of The Alliance of Bioversity International – CIAT. The opinions expressed here are those of the authors and do not reflect the views of the organization, founding bodies, or partners.

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Abstract

It is necessary to continuously monitor and evaluate the development of climate services in countries where CGIAR and its partners promote different approaches related to these. Here we show the application of a monitoring and evaluation instrument that has the objective of analyzing the scope, effectiveness, perception, and relevance of the Local Technical Agroclimatic Committees (MTA, initials in Spanish) of Guatemala. The instrument was effectively applied to nearly 300 participants from the Guatemalan MTAs to assess the fundamental aspects that must be taken into account for the proper functioning of the committees in the country, as well as the challenges and barriers faced by co-production, transfer, translation, and use of agroclimatic information. The results generally show a high adoption by users of the climate services promoted in Guatemala, highlighting their usefulness and relevance in the country.

Keywords

Climate services, climate variability, vulnerability, monitoring and evaluation, Local Technical Agroclimatic Committees, Guatemala

Contents

Contents	6
Introduction.....	13
Methods.....	16
Structure survey format.....	17
Characterization	17
Characterization of crops and climate.....	18
Perception of the quality of climate information	18
About the Agroclimatic Bulletin.....	19
Suggestions	20
Instrument application	20
Results.....	22
Characterization	22
Sex.....	22
Ethnic group.....	24
Types of Institutions	24
Role within institutions.....	28
Inclusion programs.....	30
Characterization of crops and climate.....	33
Priority crops.....	33
Common crop problems.....	35
Perception of the quality of climate information	37
Accumulated rainfall information, and beginning and end of the rainy season ..	39
Degree of comprehension of the information	42

Degree of learning.....	44
Degree of interpretation of the forecasts.....	46
About the Agroclimatic Bulletin.....	48
Estimated number of farmers receiving the Agroclimatic Bulletin.....	49
Agroclimatic Bulletin application.....	52
Limitations in the application of the recommendations.....	55
Means by which the Agroclimatic Bulletin is received and disseminated	57
Suggestions	62
About MTAs meetings.....	62
About the Agroclimatic Bulletin.....	65
About MTAs coordination	68
Conclusions.....	71
References.....	74
Annexes.....	78

Figures list

Figure 1. Local Technical Agroclimatic Committees in Guatemala and areas of influence of the different CGIAR initiatives (updated Dec 2022).....	15
Figure 2. Results on gender.	24
Figure 3. Results on ethnic group.	26
Figure 4. Results on types of institutions.....	27
Figure 5. Results on the role within institutions.	30
Figure 6. Results on the existence of gender and youth inclusion programs in institutions.....	31
Figure 7. Results on priority crops in the zones.....	35
Figure 8. Results on main problems on priority crops in the areas.....	37
Figure 9. Results on the perception of information on accumulated rainfall.....	40
Figure 10. Results on the perception of information on the beginning and end of the rains.....	41
Figure 11. Results on the degree of comprehension of the information.	43
Figure 12. Results on the degree of information learning.	45
Figure 13. Results on the degree of interpretation of the forecast.	48
Figure 14. Results on the estimation of the number of farmers who receive the bulletin from the media of the institutions.....	50
Figure 15. Results on the estimation of the number of farmers who receive the newsletter from direct contact with farmers.	52
Figure 16. Results on the application of the recommendations of the agroclimatic bulletins.....	53

Figure 17. Results on the usefulness of the information from the agroclimatic bulletins.....	55
Figure 18. Results on the limitations in the application of the recommendations.....	57
Figure 19. Results on the means of dissemination by which people receive the agroclimatic bulletins.....	59
Figure 20. Results on the media used to disseminate the bulletins.....	61
Figure 21. Results on how people could potentially disseminate agroclimatic bulletins.....	62

Table list

Table 1. Number of surveys carried out by MTA.....	22
Table 2. Identified programs and initiatives on gender and youth inclusion in MTA participating institutions.....	33
Table 3. Suggestions proposed by the participants on the development of the meetings in the MTAs	64
Table 4. Suggestions proposed by the participants on the development of agroclimatic bulletins.....	67
Table 5. Suggestions proposed by the participants on the coordination of the MTAs	69

Annexes list

Annex 1. Participatory mapping of climate and crops in Guatemala	79
Annex 2. Climatic regions of Guatemala.....	80
Annex 3. Examples of agroclimatic bulletins from Guatemala.....	81

Acronyms

CSA	Climate Smart Agriculture
CIAT	The International Center for Tropical Agriculture
IRI	International Research Institute for Climate and Society
INSIVUMEH	National Institute of Seismology, Volcanology, Meteorology, and Hydrology
MTA	Local Technical Agroclimatic Committees
MAGA	Ministry of Agriculture, Livestock, and Food of Guatemala

Introduction

Guatemala is one of the Central American countries most affected by climate variability, particularly drought conditions, which, together with vulnerable socioeconomic conditions, limit the livelihood of families and their food security. Large losses occur every year in the country's productive systems, mainly affecting small producers, who face losses of up to 70% of their crops, especially during the mid-summer drought season. To help address this problem, the CGIAR has been promoting for the last 5 years the implementation of climate services that integrate climate information adapted to the needs of users to support decision-making in the field and avoid losses at the local level, in particular, the Local Technical Agroclimatic Committees (MTA, by its initials in Spanish).

Like other Latin American countries, the MTAs in Guatemala are open spaces for dialogue between actors representing different public and private institutions, associations, academies, cooperatives, Non-Governmental Organizations, and international cooperation, among others, together with local agricultural producers of each region, to understand the possible behavior of the climate at the local level. Based on the seasonal climate information and the meteorological information issued by INSIVUMEH, agroclimatic recommendations are analyzed, discussed, and issued to help reduce the risks related to climate variability.

The first MTA was established in Guatemala in the department of Chiquimula in 2018. Since then to date, they have been rapidly establishing themselves throughout the country. In 2019, the MTAs of El Progreso, Totonicapán, Quetzaltenango, and Centro was established. In 2020, MTAs were established in the departments of

Zacapa, Alta Verapaz, Baja Verapaz, Huehuetenango, San Marcos, and Quiché. During the year 2021, new MTAs were established in the departments of Jutiapa, Petén, Sololá, Santa Rosa, Izabal, Jalapa, Escuintla, and the Southwestern area. To date, there are 19 active MTAs, whose area of influence covers 100% of the national territory (see Figure 1).

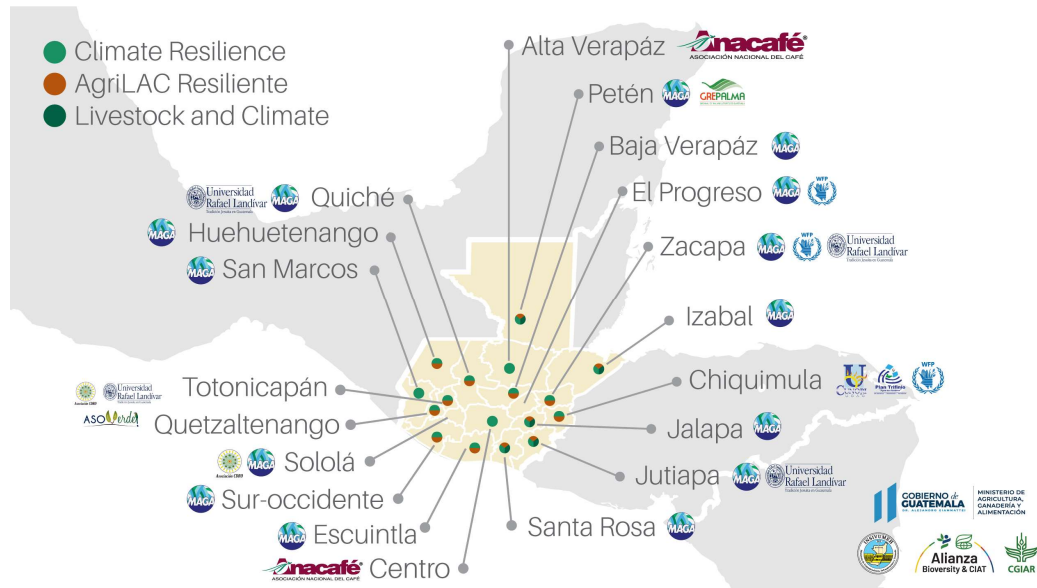


Figure 1. Local Technical Agroclimatic Committees in Guatemala and areas of influence of the different CGIAR initiatives (updated Dec 2022)

Given that the strengthening and scaling-out of the MTAs have aroused significant interest on the part of the actors of more than 100 institutions that participate in the committees, and that also, a large part of the information generated by the committees is used in the field for decision-making support, it is essential to carry out a monitoring and evaluation process that allows the identification of the fundamental aspects for the proper functioning of these spaces, as well as challenges and barriers faced by the co-production, transfer, translation, and use of information by local communities, implementing improvements.

Here we present the application of a monitoring and evaluation instrument, which was designed in previous years by CGIAR and its partners (Navarro-Racines, Zúñiga, et al., 2020) to around 300 participants from Guatemalan MTAs. This work is part of the activities of the [new portfolio of CGIAR research initiatives](#) (see Figure 1), in particular the [Climate Resilient](#) initiative (*Work Package 1*), which is promoting the scale-up and adoption of climate information service tools nutrition sensitivity and capacity building in agroclimatic risk management in Guatemala, Senegal, and Kenya, and is providing fundamental support in the strategic coordination of MTAs in Guatemala. It is also supported by the [AgriLAC Resiliente](#) initiative (*Work Package 2*) that seeks to empower stakeholders through a digital ecosystem in Guatemala, Honduras, and Colombia to offer digitally enabled agricultural advisory services for farmers who manage climate risk and sustainable intensification more effectively and is mainstreaming changes in the MTA's dissemination mechanisms in Guatemala. And finally, it is supported by the [Livestock and Climate](#) initiative (*Work Package 2*) which is developing digital services that bring together personalized climate information, risk transfer, and credit strategies to manage climate risk and inform decision-making in the livestock sector from Guatemala, Senegal, and Kenya, and is promoting access to climate services for livestock producers in Guatemala.

Methods

To analyze the scope, effectiveness, perception, and relevance of the MTA in Guatemala, in 2020 a monitoring and evaluation instrument was designed (Navarro-Racines, Zúñiga, et al., 2020) in a joint effort between the International Research Institute for Climate and Society (IRI), the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the National Institute of Seismology, Volcanology, Meteorology, and Hydrology of Guatemala (INSIVUMEH). In 2020, the first round of application of the surveys was carried out, and in 2022 a second round which results are shown in this document.

The instrument was designed as a structured survey, with five sections including 1) *personal characterization*, which seeks to know the type of committee participant in terms of gender, ethnic group, and occupation; 2) *characterization of crops and climate*, to identify the main agricultural systems in each region as well as the most recurring problems related to them; 3) *perception of the quality of climate information*, which seeks to identify the degree of understanding and confidence in the climate information displayed through the MTAs; 4) *related aspects the agroclimatic bulletin*, which seeks to understand the scope of the agroclimatic information disseminated through the MTAs in terms of several users, as well as the perception of the relevance of the agricultural recommendations that are incorporated into the bulletins; and 5) *suggestions*, both from the agroclimatic bulletins and from the dynamics of the MTAs meetings. The instrument questions are shown below.

Structure survey format

Characterization

1A) Sex

- Male
- Female
- Other _____

1B) Ethnic Group

- Ladino
- Indigenous
- Other _____

1C) What type of institution do you belong to or work for?

- Public sector (ministry, secretariat, or similar)
- Local government (municipality, government, or similar)
- Academy and research
- Association (of farmers or similar)
- Cooperative
- International cooperation
- NGO
- Private sector not related to agriculture
- Civil society
- Farmer
- Other _____

1D) What is your role in this institution?

- Farmer
- Technical assistant, agricultural promoter, extension agent, meteorological observer, or similar
- Researcher, scientist, student, or similar
- Organization leader, owner, manager, boss, coordinator, or similar
- Community leader
- _____

1E) If 1D = *Option 2, 3, or 4*: Does your institution have gender inclusiveness and youth participation programs?

- Yes Which one? _____
- No

Characterization of crops and climate

2A) What are the priority crops in the region where you work? (Select all that apply)

- Basic grains (corn, beans, rice)
- Vegetables
- Coffee
- Sugar cane or oil palm
- Other non-perennial crops
- Other perennial crops
- Other _____

2B) What are the most common crop problems in your region? (Select all that apply)

- Prolonged drought, mid-summer drought, heat wave
- Erratic behavior of the rain (poor distribution, intensity)
- Early start of rain
- Late onset of rain
- Extended rainy season
- Shortened rainy season
- Prolonged heat waves
- Extreme high temperatures
- Frost
- Strong winds
- Pests and diseases
- Soil degradation (quality, structure)
- Landslides
- Low seed quality
- Other _____

Perception of the quality of climate information

3A) Based on weather information received at the previous meeting of the MTA, on a scale of 1 to 5, how accurate were you in terms of the amount of rainfall?

Not accurate Very accurate
1 2 3 4 5

3B) Based on weather information received at the previous meeting of the MTA, on a scale of 1 to 5, how accurate were you in terms of starting/stopping the rain?

Not accurate Very accurate
1 2 3 4 5

3C) On a scale of 1 to 5, how understandable was the weather information provided at the MTA?

Not clear Very clear
1 2 3 4 5

3D) Since you attend the MTA do you think that your knowledge about climate has:

- Increased a lot
- Slightly increased
- Remains the same
- NA

3E) Since you attend the MTA do you think that your interpretation of the forecast has:

- Increased a lot
- Slightly increased
- Remains the same
- NA

About the Agroclimatic Bulletin

4A) If 1D = Option 4: How many farmers associated with your institution receive the Agroclimatic Bulletin?

- None / NA
- 1-10
- 11-50
- 51-100
- 101-300
- More than 300

4A) If 1C = Option 1-3: With how many farmers do you share the Agroclimatic Bulletin?

- None / NA
- 1-10
- 11-50
- 51-100
- 101-300
- More than 300

4B) Have you implemented or suggested any of the recommendations from the previous Agroclimatic Bulletin?

- Yes
- No

4C) If 4B = Option 1: If your answer was yes, the information from the Agroclimatic Technical Bulletin was useful for (Select all that apply):

- Crop planning (choice of planting date, fertilizers, varieties, others)
- Crop management (fertilization, shade, irrigation, pest control, others)
- Optimize resources / avoid losses
- Prevent frost, strong winds, extreme rains
- Prevent risks and disasters
- Other _____

4D) If 4B = Option 2: Do you have any of the following limitations when applying the knowledge learned? (Select all that apply)

- Lack of funds
- Lack of time
- Lack of understanding
- Lack of relevance of recommendations
- Other _____
- NA

4E) By what means do you receive the Agroclimatic Bulletin?

- Digital media (WhatsApp, Facebook, email, web pages)

- Bulletin in paper or related printed material
- Local Radio
- Face-to-face (in visits or workshops)
- Others
- I don't receive it

4F) If 1C = Option 2 o 3: What mechanism does your institution use to disseminate the Agroclimatic Bulletin?

- Digital media (WhatsApp, Facebook, email, web pages)
- Bulletin in paper or infographics
- Local Radio
- Meetings or workshops.
- Other _____
- We do not disseminate it

4G) If 5B <> Option 7: What other means do you suggest for disseminating the Agroclimatic Bulletin?

- Digital media (WhatsApp, Facebook, email, web pages)
- Bulletin in paper or infographics
- Local Radio
- Meetings or workshops.
- Other _____
- We will not disseminate it

Suggestions

5A) Do you have any suggestions to improve the dynamics of the Local Technical Agroclimatic Committees meeting?

5B) What additional information would you suggest appearing in the Agroclimatic Bulletin?

Instrument application

The monitoring and evaluation instrument was designed to be applied through an online format (Google Forms), to members of the 19 MTAs of Guatemala during October, November, and December 2022. People were contacted through telephone

calls through the personal data that each person personally provided in the registration records committee assistance.

The final size of the sample was 294 people belonging to the 19 MTAs, as can be seen in the Table below. To carry out the surveys, we had the support of a student from the Faculty of Agronomy of the University of San Carlos (USAC) of Guatemala, who was linked as a temporary intern to the work team of the Inter-American Institute for Cooperation on Agriculture – IICA.

Table 1. Number of surveys carried out by MTA

No.	MTA	Surveys conducted
1	El Progreso	20
2	Zacapa	20
3	Centro	20
4	Quiche	20
5	Huehuetenango	20
6	San Marcos	20
7	Alta Verapaz	7
8	Baja Verapaz	18
9	Quetzaltenango	20
10	Jutiapa	20
11	Jalapa	9
12	Sololá	15
13	Petén	18
14	Izabal	12
15	Suroccidente	13
16	Santa Rosa	15
17	Escuintla	9
18	Chiquimula	8
19	Totonicapán	10
Total		294

Results

Characterization

Sex

Figure 2 shows the results of the consultation on gender. As observed in the graphs, in most of the national territory, the participation of the male gender predominates in the MTAs with a percentage greater than 80%, especially in Alta Verapaz, Jalapa, and Suroccidente (Retalhuleu and Suchitepéquez) where they reach 100%. In the departments of Quetzaltenango, Totonicapán, and Sololá, in the western part of the country, there is more participation of women. Especially in Totonicapán with 50% and Quetzaltenango with 25%, the latter being the second most economically important city in the country. Other MTAs that have more than 20% female participation are El Progreso and Santa Rosa, in the eastern part of the country.

The results highlight the inequalities that exist between men and women in Guatemala above other Latin American countries. According to a report by the United Nations Development Program (UNDP), Guatemala is in a deficient situation, with the highest gender inequality index (IDG), the highest in the Latin American region (0.479), showing high differences that disadvantaged women about men (UNDP, 2022). Even though the participation of women has grown in recent years in the MTAs, gender inequality persists in terms of access to agroclimatic information, and it is necessary to continue working from the research field to close this gap.

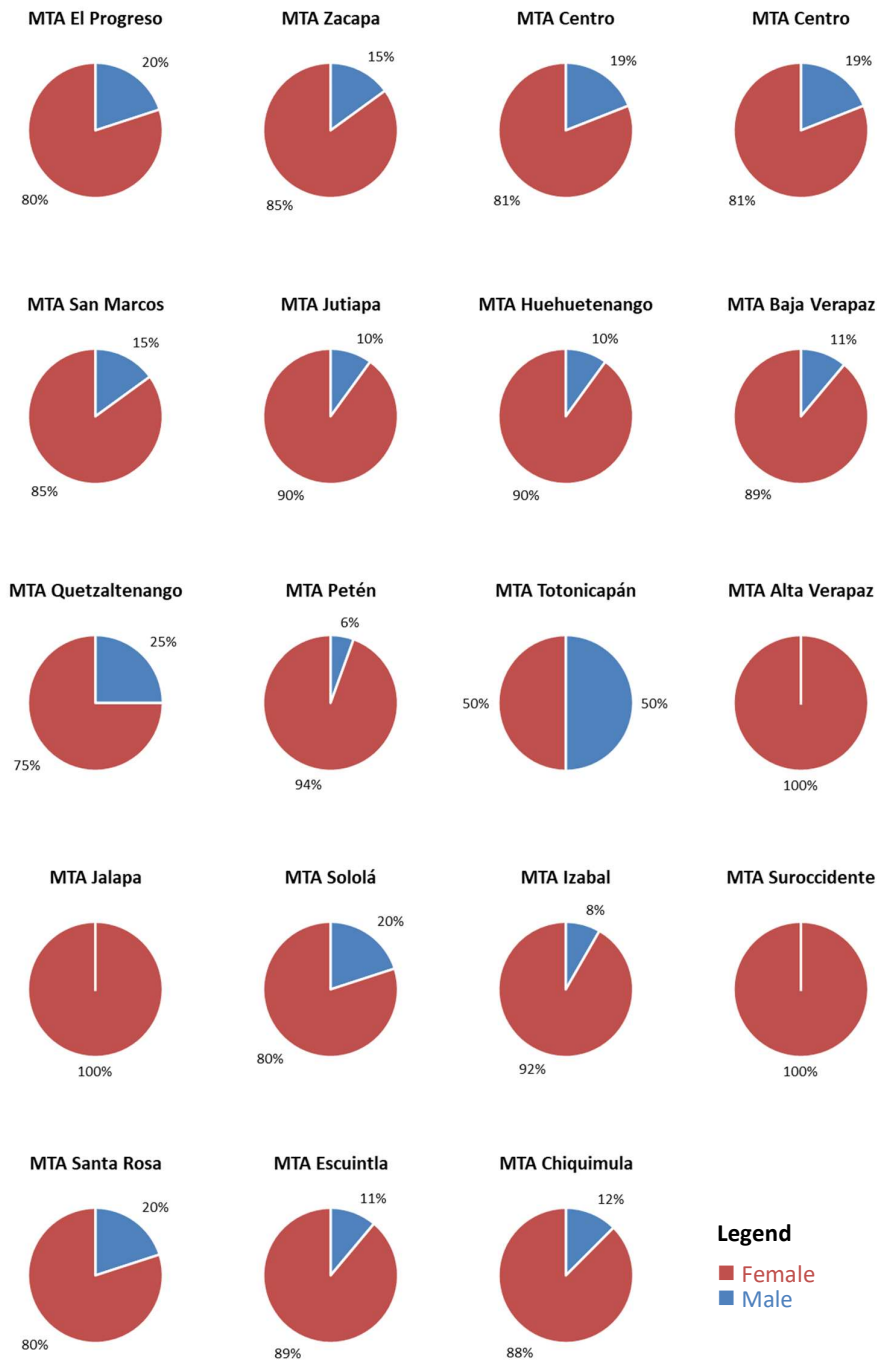


Figure 2. Results on gender

Ethnic group

As can be seen in Figure 3, the actors of 12 of the 19 MTAs that are in the country identify themselves mainly as ladinos (>90%). In the western MTAs (Quetzaltenango, Totonicapán, and Sololá), an important part of the participants identifies themselves as people of indigenous descent (15% to 40%), while the northern (Alta Verapaz) and eastern (Zacapa and Santa Rosa MTAs), a lower percentage consider themselves indigenous (>10%).

Guatemala is one of the countries with the largest populations of indigenous people, with more than 80% of the total in the region (World Bank, 2015). The last census of 2018 indicates that 42% of the population identifies as belonging to indigenous people (INE, 2018). Even though it is a multiethnic, multicultural, and multilingual country, discrimination and inequality against indigenous people persist (IACHR, 2022). The participation of people belonging to indigenous communities in territorial agreement spaces such as MTAs is an indicator of how climate services in the country can continue to contribute to social inclusion in aspects such as access to information and the representativeness of these communities in spaces of public debate.

Types of institution

Figure 4 shows the results of the question related to the types of institutions that are part of the MTAs. Even though efforts have been made to achieve diverse institutional participation, the presence of the public sector (ministries, secretariats, the meteorological service, or similar) predominates in most of the committees.

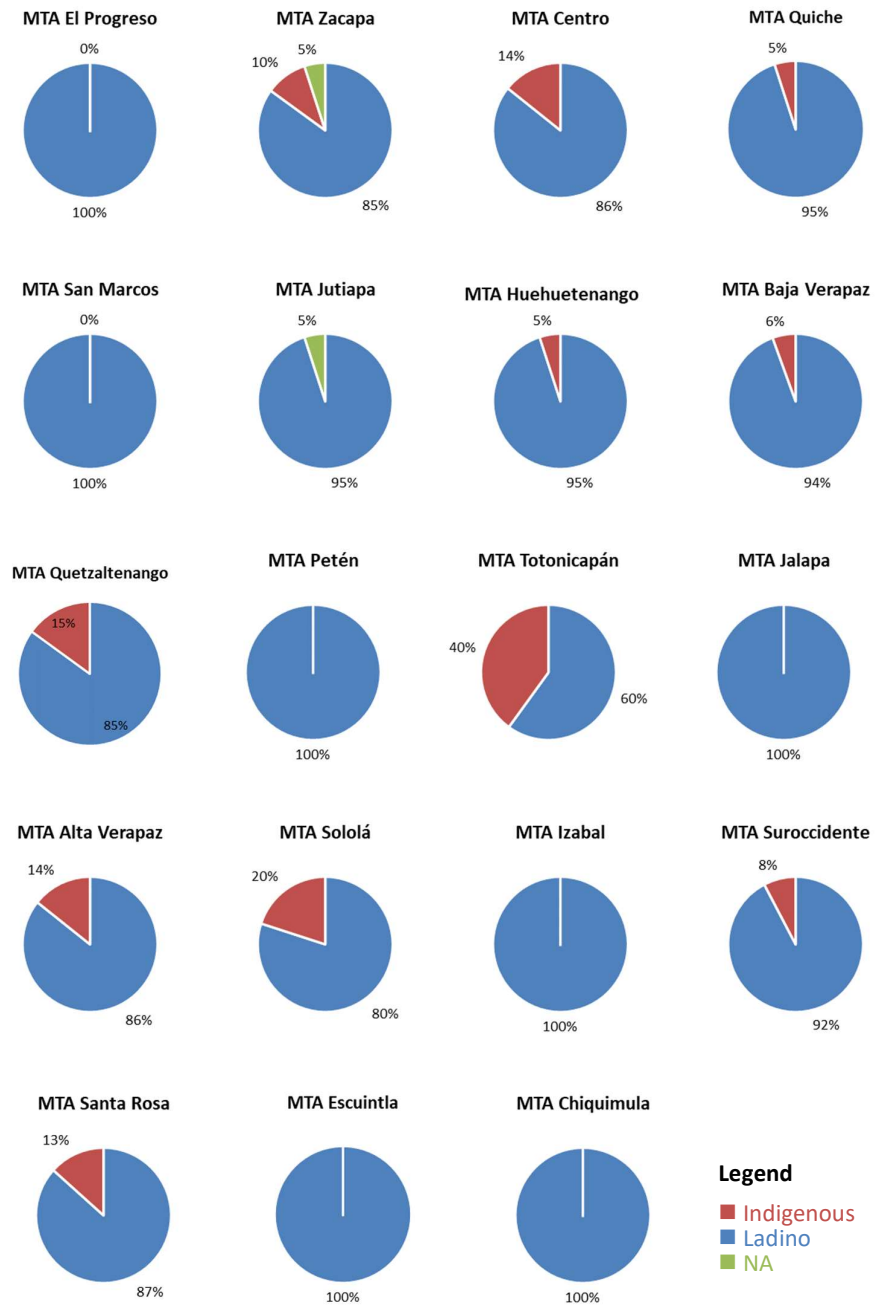


Figure 3. Results on ethnic group

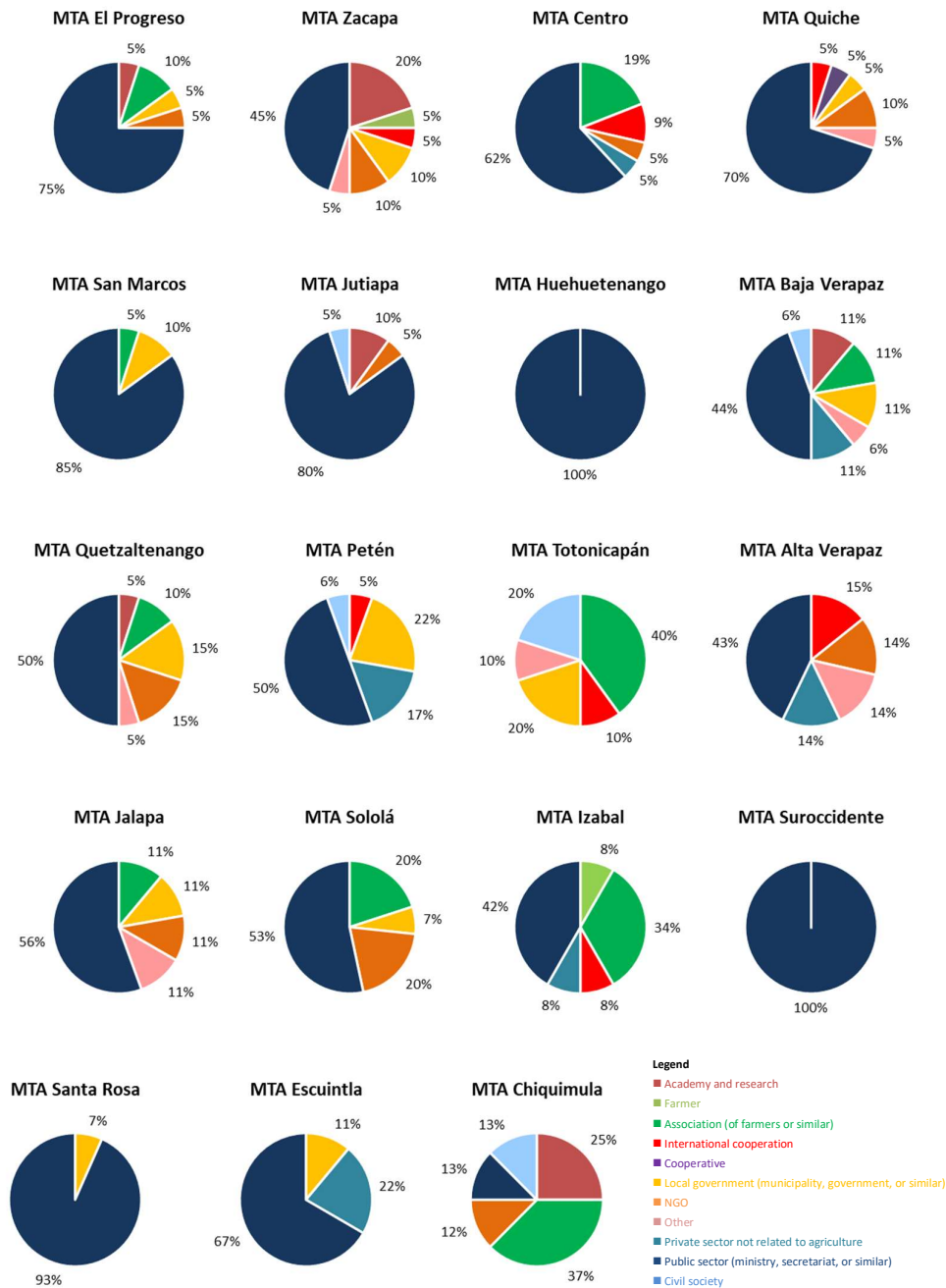


Figure 4. Results on types of institution

Although there are committees with full public sector participation, such as those in Huehuetenango and Suroccidente, there are also more heterogeneous ones (e.g., Zacapa, Baja Verapaz, Quetzaltenango, Petén, Alta Verapaz, Izabal). It is worth

highlighting the MTAs of Totonicapán and Chiquimula, committees that have different sectors represented more equitably. It is important to mention the increased participation of academia, NGOs, international cooperation, and producer associations, in recent years in all MTAs.

The participation of individual farmers in the MTAs is low, however, there are important efforts in committees such as Zacapa, Chiquimula, and Izabal to integrate them into the meetings. Farmers mainly receive agroclimatic information through extension agents from local agricultural associations, cooperatives, and from the ministry of agriculture, who are highly represented at the committees (e.g., El Progreso, Centro, San Marcos, Baja Verapaz, Quetzaltenango, Jalapa, Sololá), especially Sololá, Izabal, and Chiquimula, with the representation of 20% or more. In the current MTA model, the technicians are in charge of interpreting the information in the bulletin and transmitting the knowledge to the farmers in a simple and understandable language for them. In Guatemala, there is a wide extension network at the public level, where for each one of the 340 municipalities in the country there are at least three MAGA extension agents, in addition to departmental extension heads.

Other types of institutions frequently recurring in the roundtables are the local government, which participates in committees located in the west and east of the country (e.g., El Progreso, Zacapa, Quiché, San Marcos, Baja Verapaz, Quetzaltenango, Petén, Totonicapán, Jalapa, Sololá, Santa Rosa and Escuintla). International cooperation institutions participate more frequently in committees located in the metropolitan region (e.g., Centro), west (e.g., Quiché, Totonicapán), north (e.g., Alta Verapaz, Petén), and the eastern valleys (e.g., Izabal, Chiquimula),

regions where there is generally financing for development projects due to specific vulnerabilities to climate variability and change.

The MTAs are vehicles that also serve to coordinate activities between institutions, looking for their members to appropriate the methodology, and alternating roles, and tasks among the participating organizations¹. Due to this, it is necessary to continue working from the research field to promote the diversification of institutions in the committees.

Role within institutions

MTAs are also meeting spaces, where networks are built, and collective plans are carried out beyond the MTA agenda, being a space that encourages meeting people from other places and exchanging knowledge and experiences (Giraldo-Mendez et al., 2019).

As can be seen in Figure 5, there is a majority participation of the agricultural productive sector (technical assistants, agricultural promoters, extension agents, meteorological observers, or similar) who are the actors with the greatest contact with farmers. There is also the participation of leaders in organizations such as *owners, managers, bosses, coordinators, or similar*. The results also show good participation of academic personnel such as *researchers, scientists, students, or similar*.

¹ <https://ccafs.cgiar.org/es/mesas-tecnicas-agroclimaticas-mta>



Figure 5. Results on the role within institutions

The committees with the highest participation in the agricultural production sector are Huehuetenango and Suroccidente, it should be noted that this is directly related to the high participation of the public sector which could be seen in Figure 4. The MTAs with the highest participation in that sector are located mainly in the west and east of the country (e.g., El Progreso, Zacapa, Jutiapa, Jalapa, Santa Rosa, Centro, Quiché, San Marcos, Sololá, and Escuintla). The group of *organization leaders* shows greater participation in tables such as Baja Verapaz, Petén, Totonicapán, and Alta Verapaz, which in turn coincide with the tables that are made up of a diversity of institutions. The academic sector participates more in the tables of Escuintla and Chiquimula.

Inclusion programs

In all coverage areas, there is gender inclusion and the participation of the youth population as a transversal axis, as can be seen in Figure 6. Many of these programs are oriented towards sustainable agricultural production and the inclusion of women and youth in various projects and production processes, which are led by multiple organizations that participate in the committees. Each institution freely elaborates on the form and content of its gender and youth inclusion programs. From the surveys carried out, it was possible to identify 125 different initiatives and programs carried out by the participating institutions of the Guatemalan MTAs. Some of these are listed in Table 2. Programs focused on supporting the entrepreneurship of women and youth, training programs for women and youth on environmental and productive issues, producer groups made up mostly of women, and food security, among others.

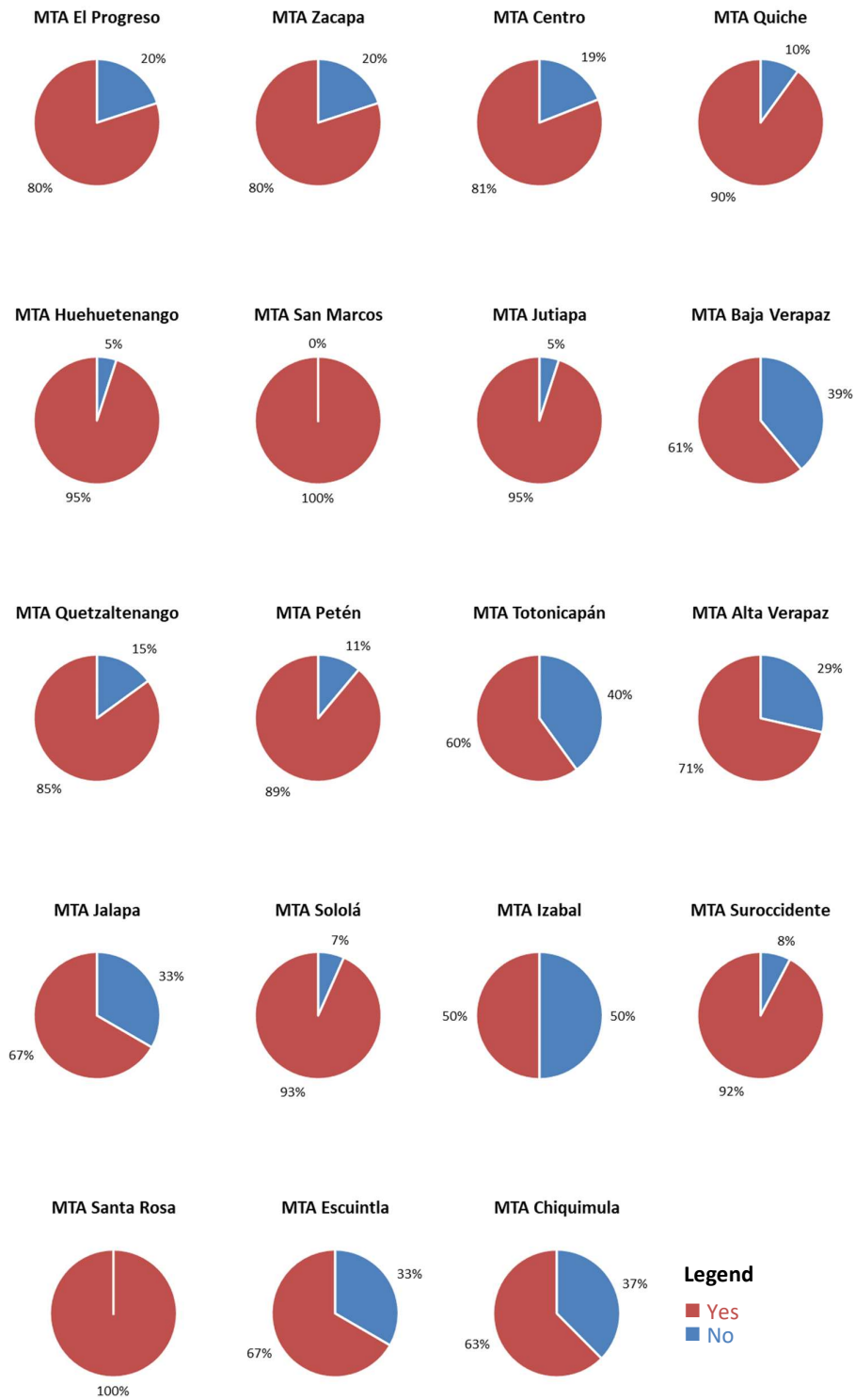


Figure 6. Results on the existence of gender and youth inclusion programs in institutions.

Table 2. Identified programs and initiatives on gender and youth inclusion in MTA-participating institutions

<i>Pro Resilience Program.</i>	<i>Gender component.</i>
<i>Country home.</i>	<i>Youth delegates in each agency.</i>
<i>Youth training.</i>	<i>Area of youth and adolescence.</i>
<i>Family programs.</i>	<i>Education for the rural home, youth, and childhood.</i>
<i>Programs for women and youth in rural areas.</i>	<i>Youth entrepreneurship.</i>
<i>Volunteers.</i>	<i>Research projects and gender policies.</i>
<i>Family agriculture.</i>	<i>Unity of gender and indigenous peoples.</i>
<i>Municipal youth offices on food safety issues.</i>	<i>SMEs</i>
<i>Community development for communities.</i>	<i>Sowing footprints and pro forests</i>
<i>Women's support group.</i>	<i>Productive projects</i>
<i>Young builders.</i>	<i>Women's organizations and youth committees.</i>
<i>Certifications.</i>	<i>A platform for small entrepreneurs and young people.</i>
<i>rural youth</i>	<i>community program</i>
<i>Internships for young people within the institution.</i>	<i>Internal policies that are financed with own expenses.</i>
<i>Childhood, youth, and adolescence</i>	<i>Environmental Education and Reforestation Program.</i>
<i>Internal gender policy.</i>	<i>ecological guardians.</i>
<i>Clubs for youth integration.</i>	<i>Program for small producers.</i>
<i>Training for youth groups and support for families in rural areas.</i>	<i>Support with rural youth.</i>
<i>Boost your company.</i>	<i>Agricultural youth programs.</i>
<i>Your company grows.</i>	<i>Program to train young people and women in productive issues and entrepreneurship.</i>
<i>Market access for small producers.</i>	<i>Training in Universities.</i>
<i>Rural extensions.</i>	<i>Youth learning centers.</i>
<i>Training, field trips, and technical assistance to youth and women.</i>	<i>Community environmental system.</i>
<i>Gender and entrepreneurship.</i>	<i>Law and economic empowerment.</i>
<i>Agricultural technical assistance, nutrition, and training.</i>	<i>Feeding programs.</i>
<i>grow up healthy</i>	<i>Education program, equity program, and food security program.</i>
<i>Help me grow.</i>	<i>Education, food safety, computer, home, and life training programs.</i>
<i>Promotion of agriculture in young people and groups of women.</i>	<i>TIP V.</i>
<i>Productivity and entrepreneurship for young people</i>	<i>Young leaders for the communities.</i>
<i>Entrepreneurship and empowerment of women.</i>	<i>Inclusion of young people and women in jobs.</i>
<i>Participation of young people in civic services, training, and technical advice.</i>	<i>The young leader of impact.</i>
<i>Rural youth unit.</i>	<i>Young men and women in cafe.</i>
<i>Social projects with young people.</i>	<i>Training, diplomas, and environmental rooms.</i>
<i>An educator for the home and rural youth.</i>	

Characterization of crops and climate

Priority crops

As shown in Figure 7, basic grains cover most of the country's agriculture and occupy the largest surface area with potential agricultural use. These crops are the basis of food and nutritional security for the Guatemalan population (INE, 2020). Its harvest is used as a means of subsistence and in some cases as a means to obtain surpluses. It is important to mention that the area devoted to basic grains has decreased since 2003, giving way to permanent herbaceous crops. The Escuintla, Suroccidente, Jutiapa, and Alta Verapaz MTAs are the ones that have suffered the greatest losses in the area of basic grains (MAGA, 2021).

Another of the most relevant productive systems, according to surveys, are vegetable crops that are characterized by their wide diversity of products as well as fruits. They are planted by cycles in practically all the MTAs. On the committees of Huehuetenango, Alta Verapaz, Jalapa, Sololá, Santa Rosa, and Chiquimula, coffee cultivation also prevails, this being one of the most economically important export items in the country (MAGA, 2021). Indeed, perennial crops headed by coffee, followed by sugar cane, African palm, rubber, and cardamom, among others, represent an important source of foreign currency for the national economy and generate thousands of jobs for the rural population mainly (See Annex 1 for more detail). In Guatemala, peasant family agriculture produces 70% of the food that reaches the table, occupying 38% of the economically active population (FAO, 2016; SESAN, 2019).

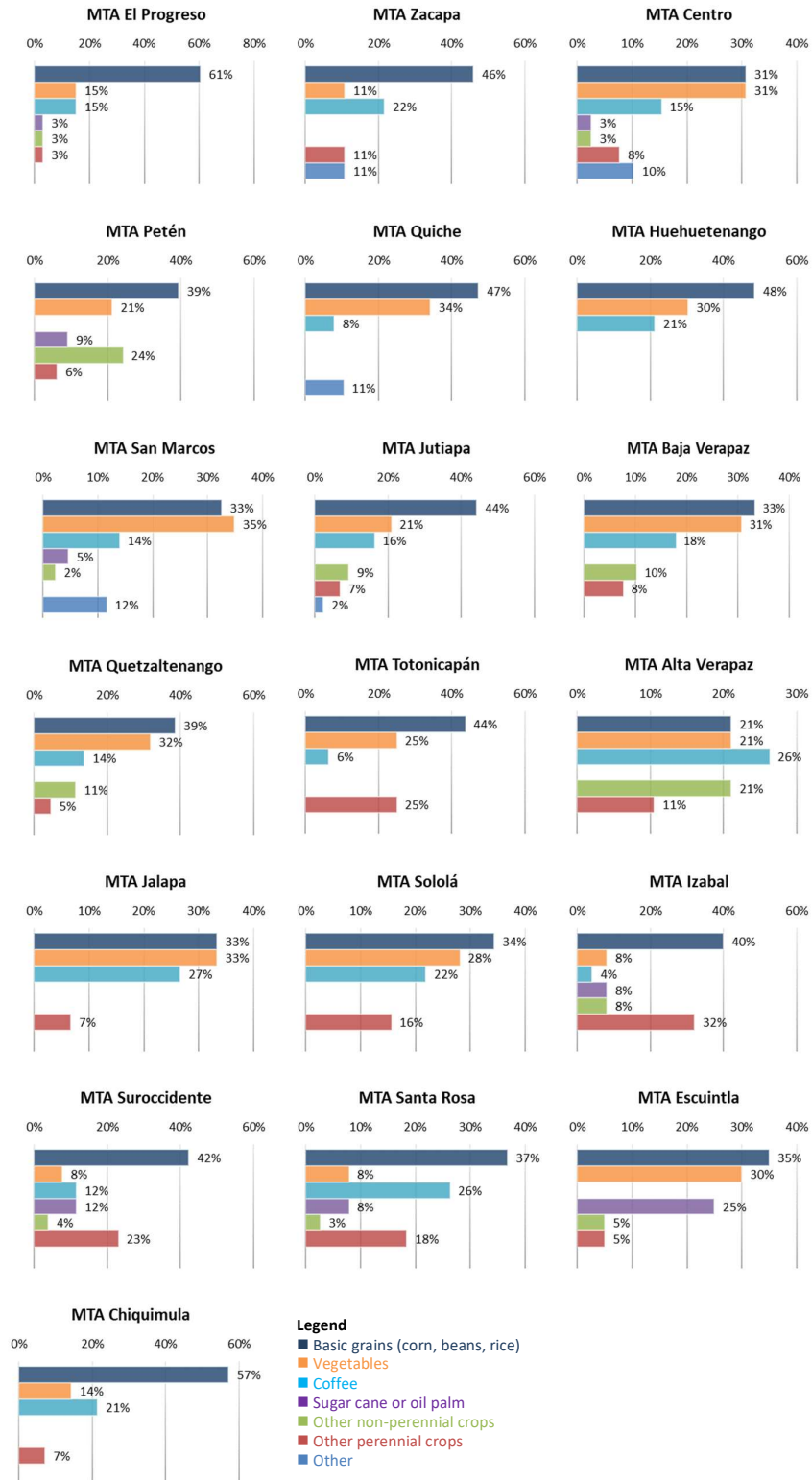


Figure 7. Results on priority crops in each MTA.

Common crop problems

Guatemala is the northernmost country in Central America, despite not having a large geographical extension compared to other countries in the region, it is characterized by diverse topography and geology and by the presence of different climatic zones, and a high diversity of microclimates. (See Annex 2). Its geographical diversity allows the production of a variety of crops, in addition, accentuates vulnerability conditions related to climate variability. Historically, Guatemala has been one of the countries most affected in the world by extreme weather events.

According to the information collected, the main problems in agriculture derive from the effects of climate variability that have manifested themselves in recent years, such as drought or prolonged heat waves, a recurring problem throughout the country, with a special impact on MTAs such as El Progreso, Zacapa, Chiquimula, Jutiapa, Jalapa, Baja Verapaz and Quiché (Figure 8), of which several are part of the so-called dry corridor of Guatemala.

Another of the most common problems identified is the erratic behavior of rainfall (e.g., poor distribution, and intensity), mainly in the MTA located in Quetzaltenango, Izabal, and Escuintla. Similarly, the extended rainy season appears as one of the main climatic factors that cause damage to crops through pests and diseases, as manifested mainly in the western MTAs (Quiché, San Marcos, Huehuetenango, Quetzaltenango, Totonicapán), east (El Progreso, Jutiapa, Jalapa, Santa Rosa, and Chiquimula), Center and Petén.

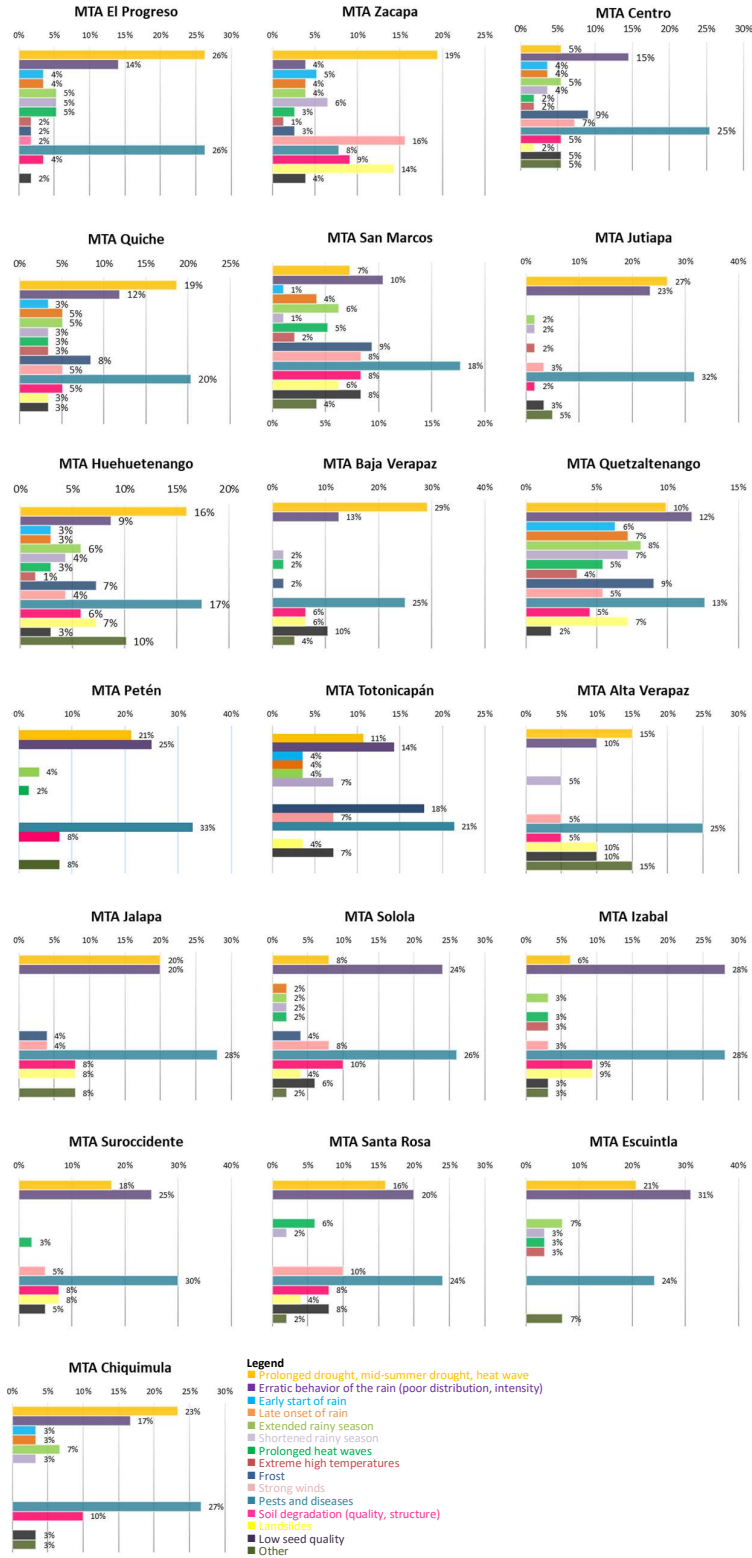


Figure 8. Results on main problems on priority crops in the areas.

Both erratic behavior and the presence of diseases and pests cause large losses that considerably affect the national economy and in particular that of producers, putting the food security of families at risk (INSIVUMEH, 2016).

Perception of the quality of climate information

In the MTAs, information related to the weather and climate conditions of the past, present, and future is shared (Giraldo-Mendez et al., 2018; Loboguerrero et al., 2018), as described below:

- From the past, it is necessary to perform a good characterization and historical analysis of each particular area, which is why time series information from weather stations and their most relevant statistical metrics are analyzed.
- From now on, preventive measures can be taken with good monitoring of the weather conditions, what is happening and where these alerts are going off to make decisions in almost real-time, for example, when a pest or disease appears. Therefore, we need to know the information products on a daily, and weekly scale, as well as the monitoring tools in real-time, which allow us to make short-term decisions.
- From the future, the main information product incorporated in the MTAs is the seasonal climate forecast (from 1 to 3 months), which has become relevant in recent years due to its use as a basic instrument in planning and decision-making. short and medium term (e.g., choice of planting date, choice of varieties). Questions like this, how will the weather be in my next crop

cycle? These are frequent questions that can be analyzed in light of the forecast.

The constant development of satellite data for weather and climate monitoring, of climate models that couple features related to the ocean and the atmosphere, and of increasingly dense networks of weather stations, contribute greatly to having information products that are increasingly available, robust, and reliable, and greatly help decision-making in agriculture in spaces for territorial agreement such as MTAs. The seasonal forecast, whose main objective is to show the prediction of climatic anomalies a few months in advance, is one of the information products that has developed significantly in recent decades thanks to these advances.

The development and informed use of more robust climate forecasts are important components of the success of climate services. An innovative method of generating climate forecasts that have been successfully applied in MTAs is the New Generation of Forecasts “NextGen” (IRI, 2020). NextGen provides objective and flexible forecasts on multiple time scales, including sub-seasonal and seasonal, in a variety of formats and for different variables of interest, such as rainfall, temperatures, crop yields, and vegetation indices, among others (Goddard et al. al., 2020; Muñoz et al., 2019; Pons et al., 2020).

Guatemala is a pioneer country in the world in the application of NextGen. Seasonal probabilistic forecasts generated by INSIVUMEH with the support of IRI provide information consistent with observations and are useful for making climate-smart decisions. These forecasts designed to suit users are making it possible to offer products for the implementation of better climate services in Guatemala about the

management of agriculture and food security, water, disaster risk reduction, health, and energy.

Meteorological and climate prediction information, particularly the flexible seasonal forecast, is becoming increasingly known, understandable, and applied by MTA participants (Giraldo-Mendez et al., 2019) who show high reliability in the information according to the monitoring and evaluation process carried out.

Accumulated rainfall information, and beginning and end of the rainy season

The perception of the information of accumulated rainfall and starting and ending of the rainy season among the participants of the Guatemalan MTAs are shown in Figure 9 and Figure 10 respectively. The results obtained show reliability in the climatic information, particularly in accumulated rainfall.

Considering all the MTAs analyzed, 84% stated that the forecast of the amount of rain was correct, showing the degree of confidence of the users of the climatic information generated by the meteorological service. There are some variations in trust among some MTAs, particularly in committees such as Quiché, Huehuetenango, and Totonicapán where between 35-40% mention that they have medium confidence in the information. Only in two cases was the information computed incorrectly, these being the committees of El Progreso and Izabal.

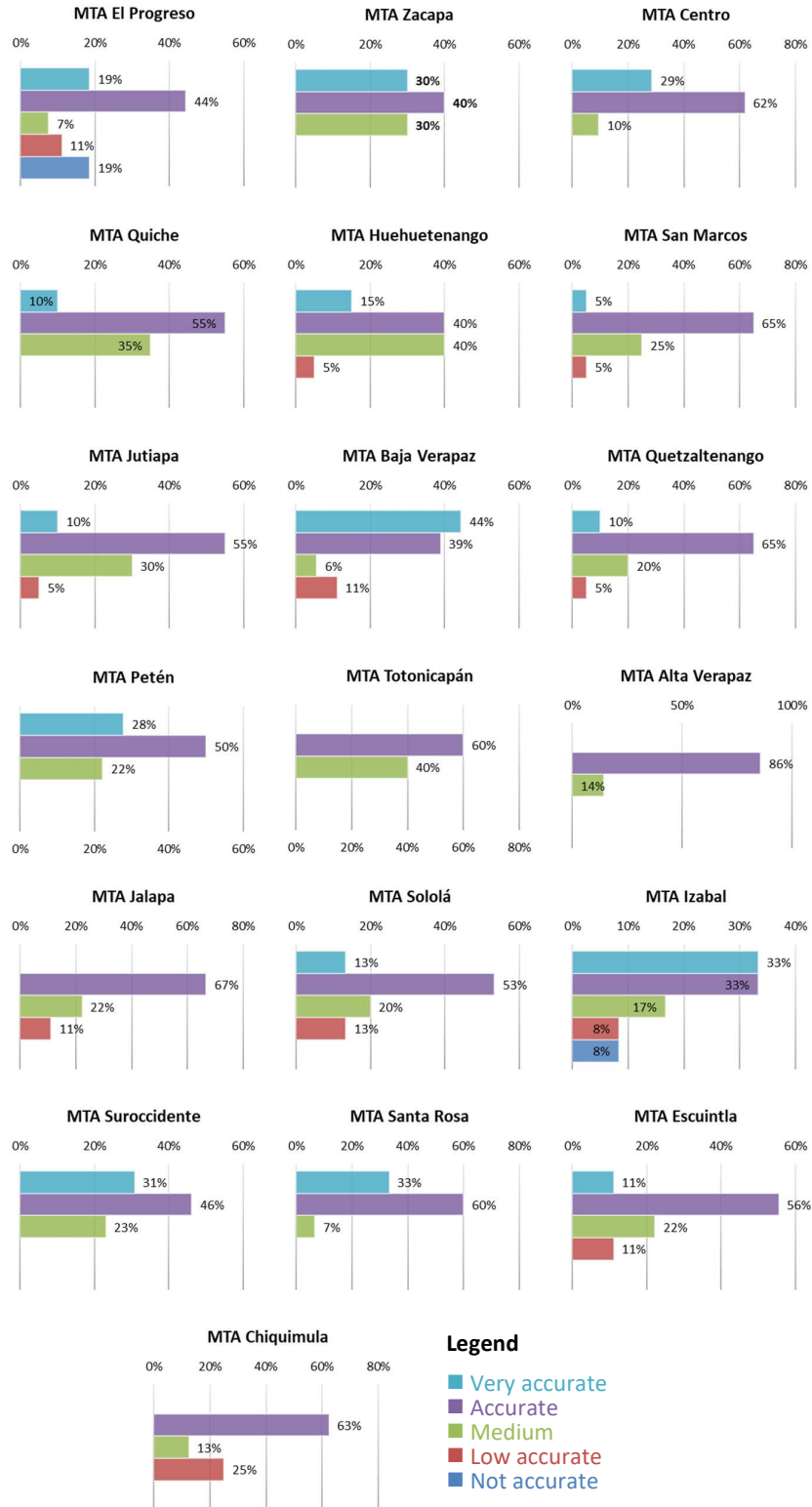


Figure 9. Results on the perception of information on accumulated rainfall.

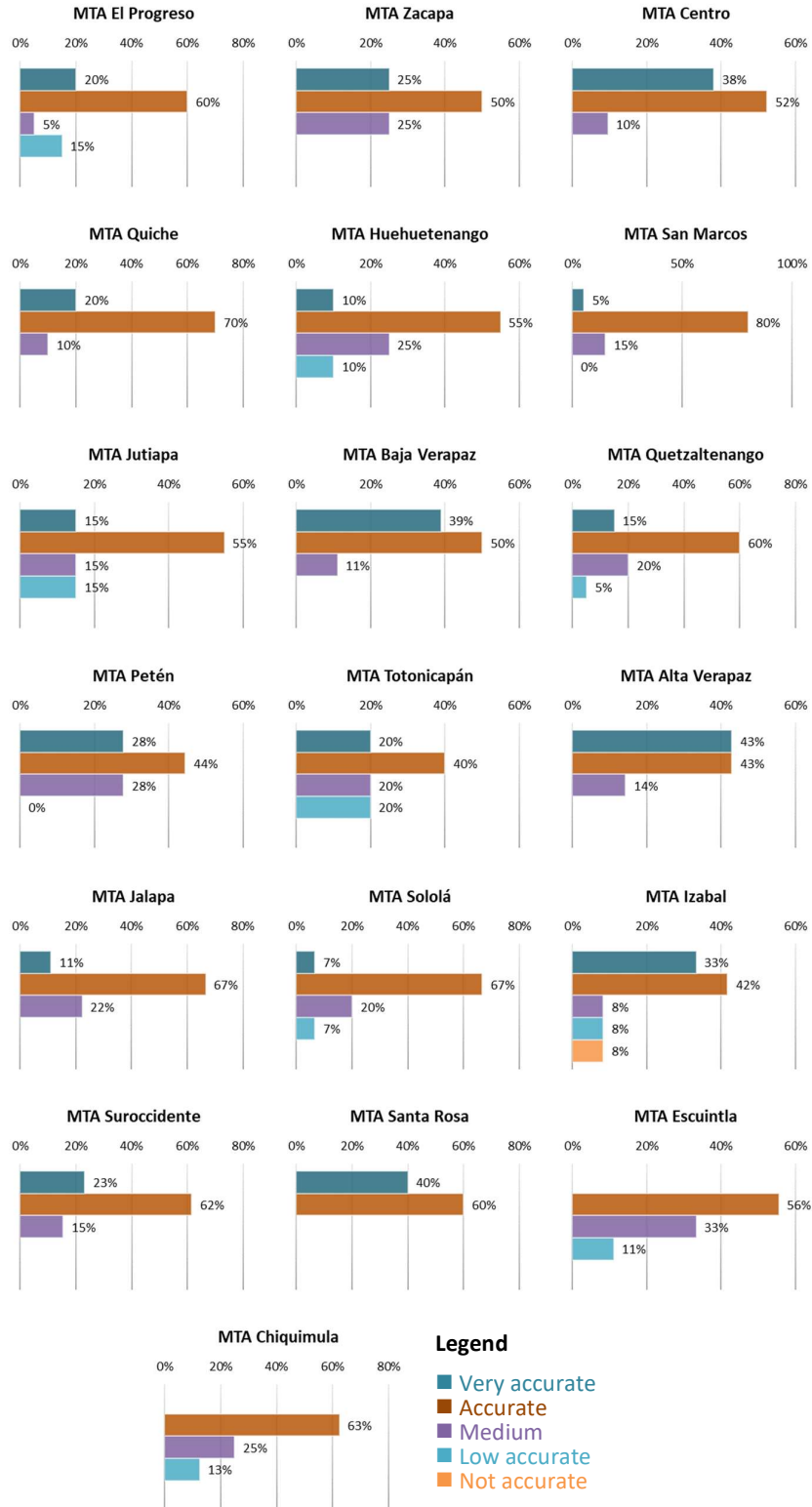


Figure 10. Results on the perception of information on the beginning and end of the rains.

Similarly, the perceived confidence regarding the information related to the start and end of the rainy season is high. All the tables agreed that the estimates of the start or end of the rain were accurate.

Degree of comprehension of the information

The degree of understanding of climate information in Guatemala through the MTAs is classified as very understandable for 63% of the tables (Figure 11) with 53% of the surveyed population. The remaining 37% perceive the understanding of the information as understandable, representing 36% of the surveyed population. It is noteworthy in this regard that the information presented in the MTAs is designed simply and graphically, to ensure its understanding among users not commonly familiar with weather and weather information.

It is important to mention that through different institutions that are part of the MTAs, significant efforts are being made to design versions of agroclimatic bulletins and other types of communication materials such as radio spots (Hernández-Quevedo & Navarro-Racines, 2022) designed specifically for farmers, as well as the translation of these into Mayan languages, for example, the MTA of Zacapa, Quetzaltenango, Petén, among others (some examples available in Navarro-Racines, 2020 and Annex 3).

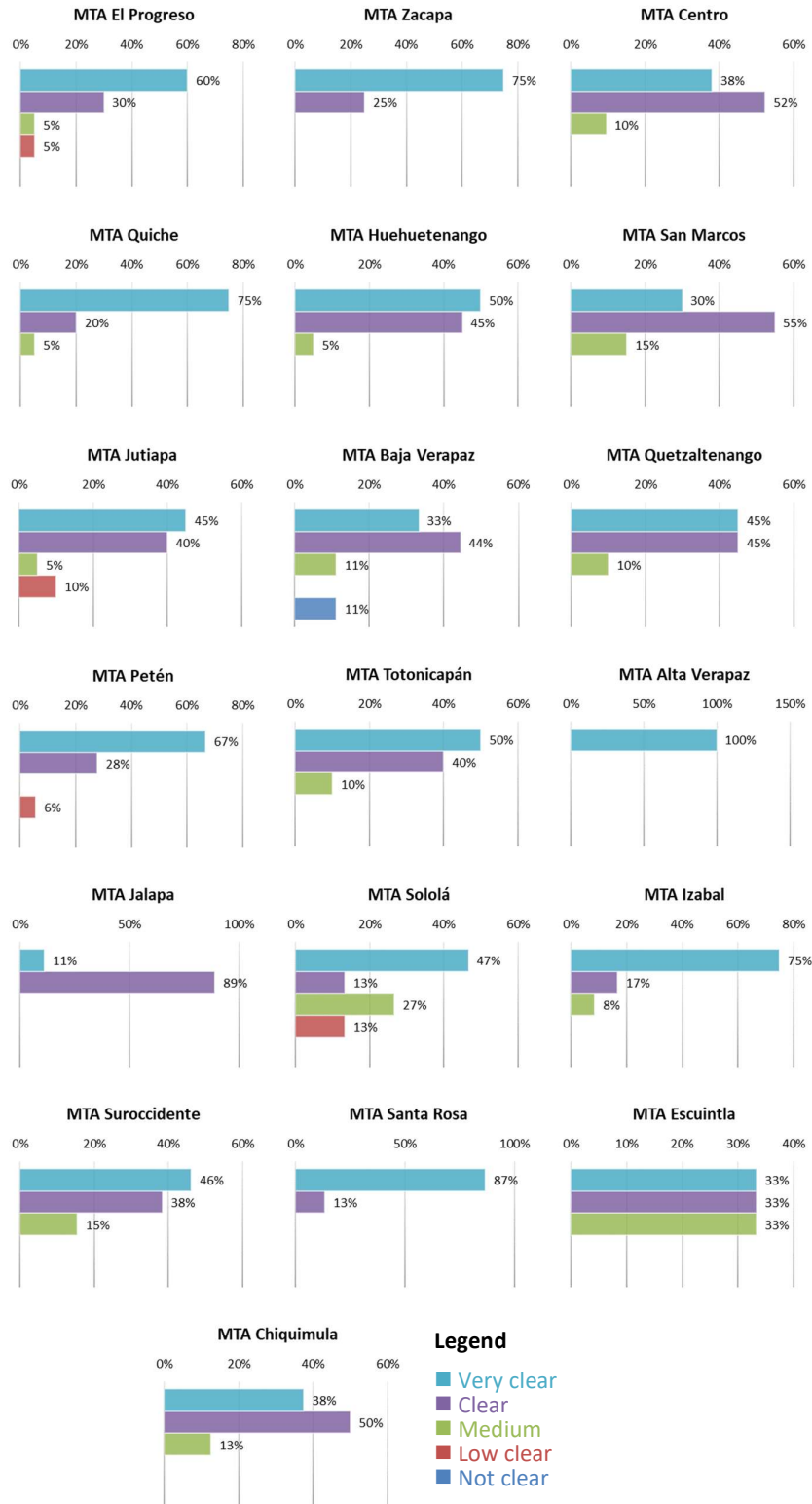


Figure 11. Results on the degree of comprehension of the information.

On the other hand, although the largest number of people claim to understand the climate information presented and disseminated through the MTAs, there is also a considerable percentage of people (around 10%) who state that their level of understanding is *medium to not at all understandable*. This result shows a clear opportunity for improvement regarding the transfer of knowledge of climate and weather and the interpretation of information.

Degree of learning

About the degree of knowledge about the weather since they attended the MTAs, 63% of the participants agree that their degree of learning has worsened significantly since they attended the MTA, 31% have worsened slightly and 6% continue to be the same degree of knowledge, this is because some have not had a constant form in the meetings, as shown in Figure 12.

More than 70% of the participants from the Zacapa, Baja Verapaz, Petén, Totonicapán, Santa Rosa, and Chiquimula MTAs indicate that their level of knowledge has increased significantly. It is relevant to indicate that, in this group of committees, some have been around for a long time, such as those in Chiquimula and Totonicapán, versus those that have been created more recently, such as those in Santa Rosa and Petén. This reflects that MTAs are not only spaces for disseminating information, but are also learning spaces, where training on topics related to climate and weather is continuously provided. Currently, the National Institute of Seismology, Volcanology, Meteorology, and Hydrology (INSIVUMEH) through EduClima, strengthens the technical capacities of the roundtable participants (e.g., terms related to climate science and climate services, interpretation of climate information and providing useful tools for decision-making), which has been developed with the

support of different academic institutions and the Alliance Bioversity International and CIAT.

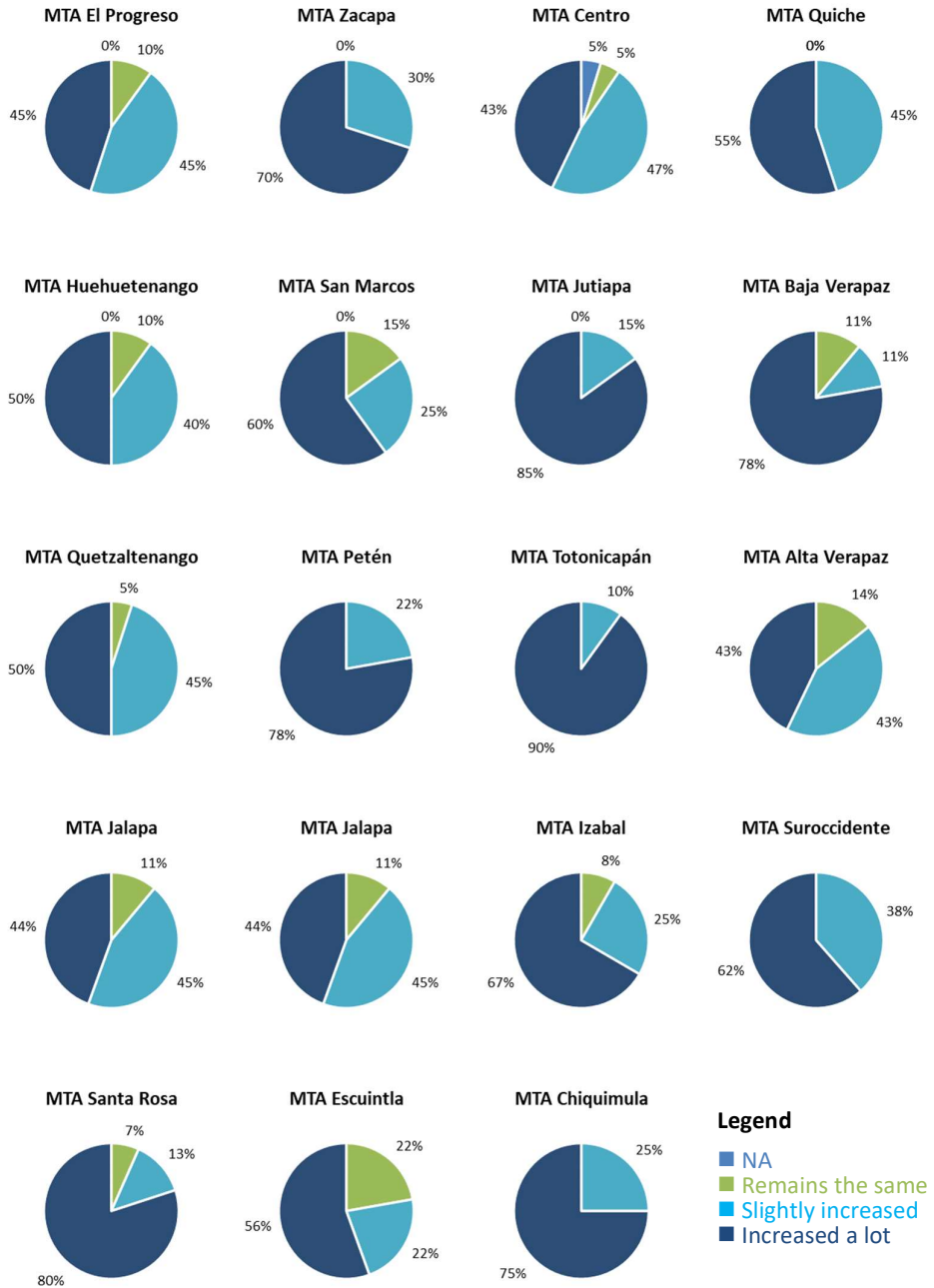


Figure 12. Results on the degree of information learning.

The democratization of knowledge is one of the areas of transformation produced by MTAs throughout Latin America, as evidenced in previous studies (Giraldo-Mendez et al., 2019). Despite the efforts made in capacity transfer and agroclimatic education, there are still great challenges so that the knowledge reaches more people so that they can use it for decision-making in the agricultural sector.

Degree of interpretation of the forecasts

The seasonal forecast (NextGen) for Guatemala developed by the national meteorological service (INSIVUMEH) with the support of IRI, has been designed to respond to the needs of users, thus allowing weather-based decisions to be made. The flexibility of the forecasts and the simple way of presenting them (see for example the INSIVUMEH-IRI² *map room*), is reflected in the degree of interpretation of the information (Figure 13).

55% of people state that the degree of interpretation of the forecast has increased significantly over time, which is evidenced in 63% of the tables, in which more than half of the respondents indicated that they handle the interpretation better of the forecasts. 41% of people indicated that their degree of interpretation increased slightly and 4% that it continues to be the same knowledge, that is, that they cannot correctly interpret the weather forecast.

² http://dl.insivumeh.gob.gt/maproom/Cuarto_Mapas_Climatologia/Estacional/NextGen_Precip.html

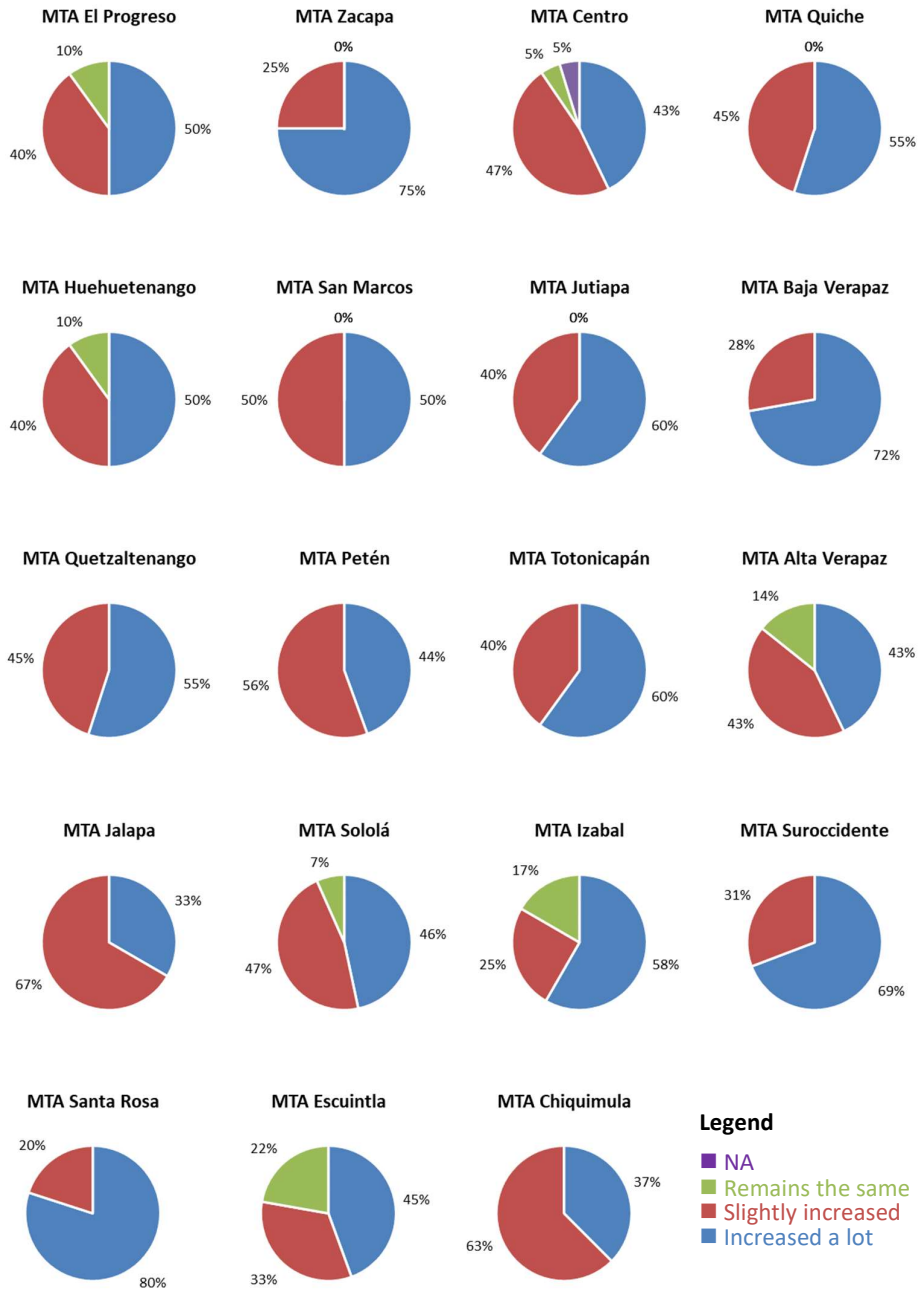


Figure 13. Results on the degree of interpretation of the forecast.

Among the MTAs that presented higher percentages that their degree of interpretation has not been so significant, are the most recently created (e.g., Petén, Jalapa) or MTAs that in recent seasons have included more producers to the sessions (e.g., Chiquimula), which participate on a rotating and non-permanent basis. It is important to mention that the rotation of the participants is reflected in this topic, therefore, it is important to continue training the members of the MTAs in the interpretation of climate information, particularly in that of Centro, Alta Verapaz, Sololá, Izabal, Escuintla, El Progreso, Petén and Jalapa.

About the Agroclimatic Bulletin

The agroclimatic bulletins are the tangible product of the MTAs. They contain information on the conditions of the last months or years of climatic variables of interest (e.g. records of nearby stations of the last months), the local climate prediction (e.g. the El Niño-Southern Oscillation -ENSO conditions and the probability of occurrence above normal, normal or below normal rainfall), the implications of climate prediction in different phenological phases of crops, and a set of recommendations to reduce negative impacts or take advantage of opportunities about the given forecast. The bulletins highlight good practices and general information on agriculture and are written in a simple, easy-to-understand manner (Giraldo-Mendez et al., 2018; Loboguerrero et al., 2018). The bulletins are designed so that they can be used as a support guide for technicians and agricultural promoters, who in turn can transfer them to farmers. As mentioned before, there are also bulletins in some of the MTAs aimed especially at farmers, and in some tables, they are translated into the main Mayan languages.

Estimated number of farmers receiving the Agroclimatic Bulletin

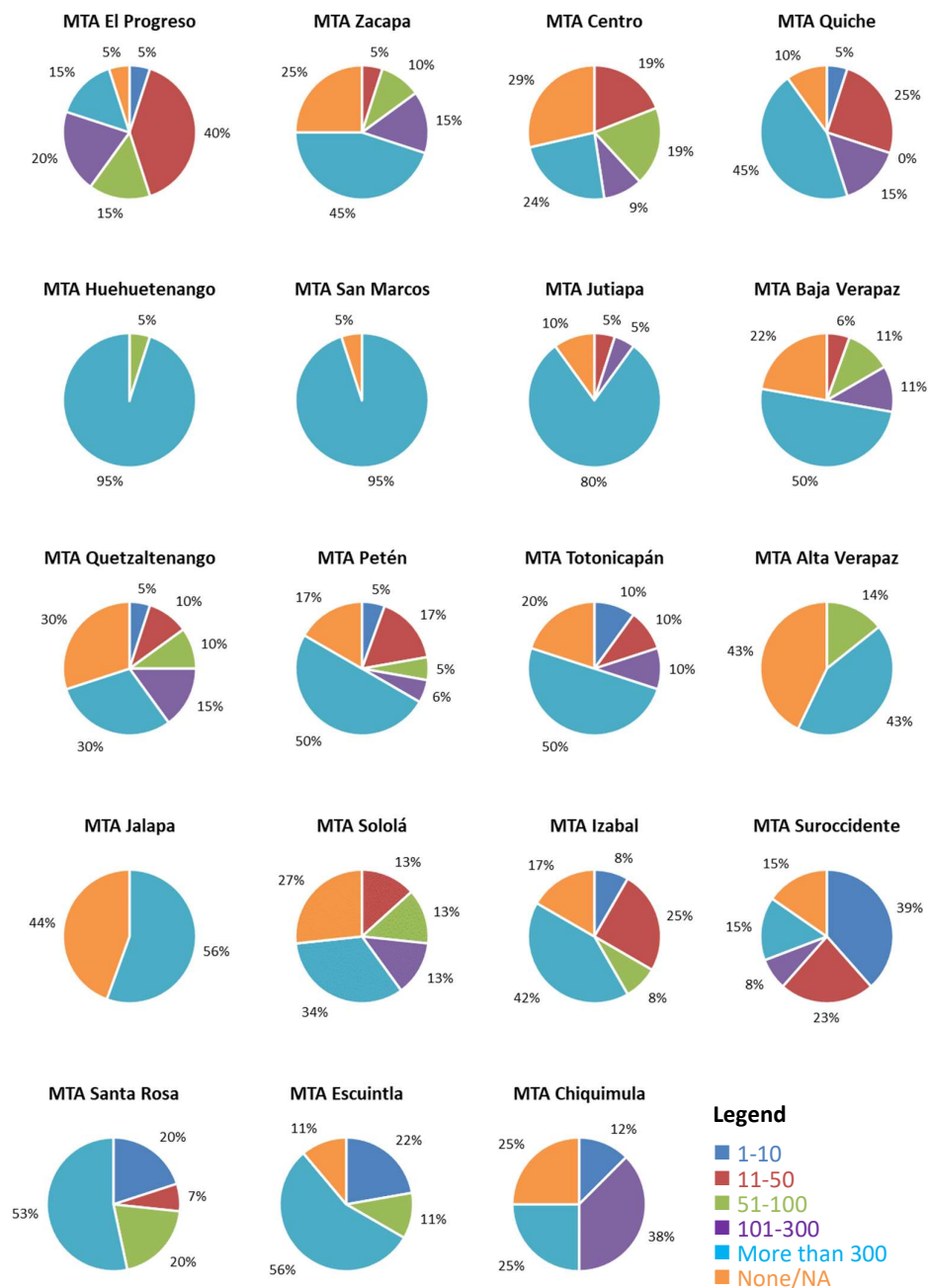


Figure 14. Results on the estimation of the number of farmers who receive the bulletin from the media of the institutions.

The number of farmers associated with the various institutions that receive the MTA agroclimatic bulletin varies depending on the location of the MTAs (Figure 14). 47% of MTAs share the newsletter with more than 300 farmers. Those with the greatest

diffusion are Huehuetenango, San Marcos and Jutiapa, other tables with greater participation of institutions and that disseminate the bulletins in a high range are Baja Verapaz, Petén, and Totonicapán.

Some of the committees show significant percentages (5% to 45%) in which they mention that no person receives the information from the agroclimatic bulletin, mainly in the tables of Jalapa and Alta Verapaz. This result is an opportunity for improvement for MTAs across the country so that the information can be disseminated to all participating institutions.

Figure 15 shows the result of the number of farmers with whom the bulletin is shared directly. 30% of the people surveyed indicated that they share it with up to 50 farmers, that is, a low range. The MTAs that correspond to this group are Jutiapa, Quiché, Huehuetenango, San Marcos, El Progreso, Baja Verapaz, Quetzaltenango, and Suroccidente. 13% of the participants share it with a maximum of 10 people and 28% share it with a maximum of 50 people. 16% of people share it with more than 300 farmers, mainly at the tables of Petén, Santa Rosa, Sololá, Zacapa, Alta Verapaz, and Izabal. Currently, most of the information that is disseminated to farmers is through the extension agents of each municipality, who have a greater reach with community leaders. 21% of the participants do not share the newsletter with farmers, according to what they indicated, this is because certain institutions have not been able to implement an adequate way to disseminate it, however, they are in the process of identifying the most appropriate mechanism to provide to farmers the bulletin.

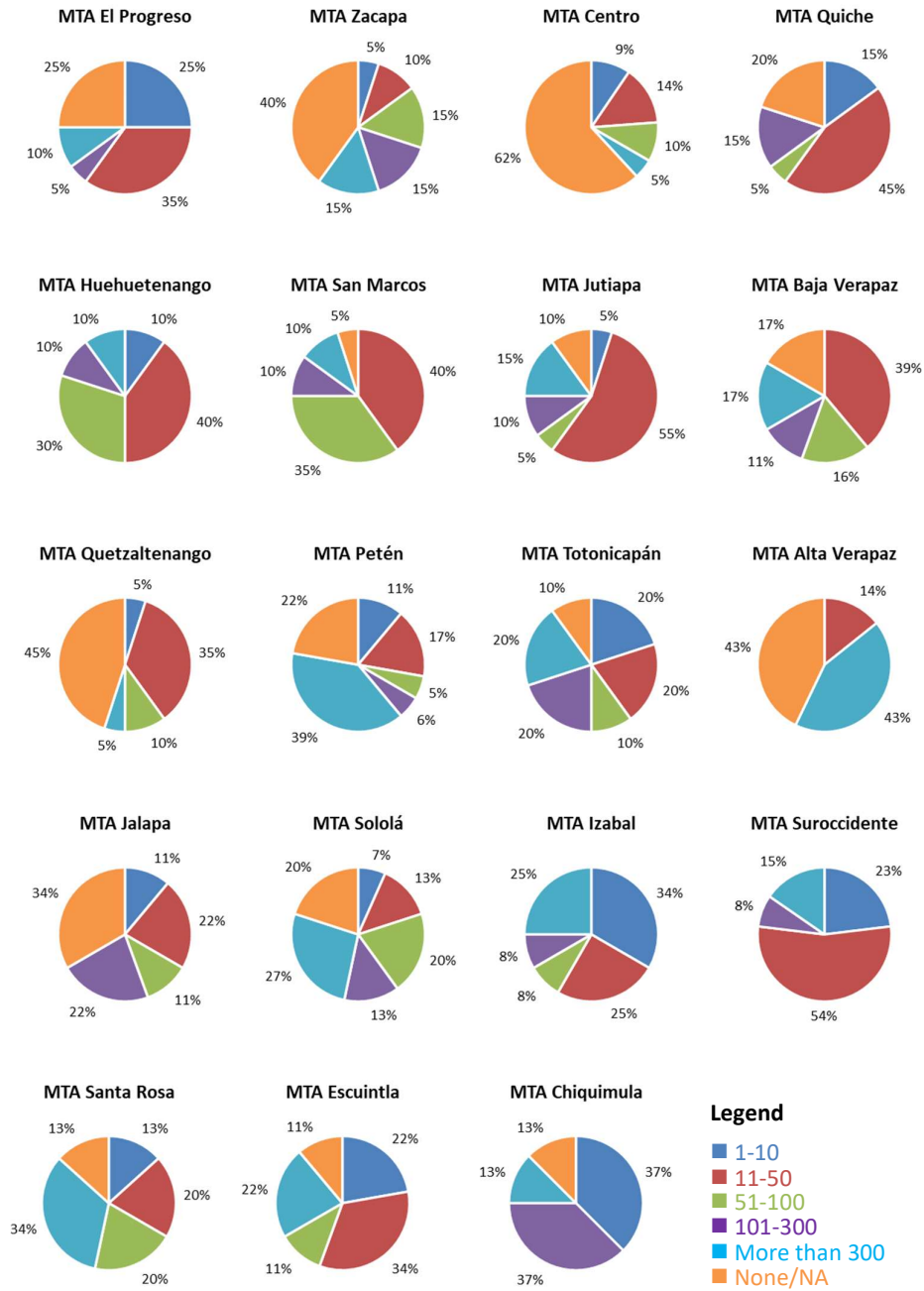


Figure 15. Results on the estimation of the number of farmers who receive the newsletter from direct contact with farmers.

Agroclimatic Bulletin application

In all the MTAs, more than 50% of the participating people have implemented or suggested some of the recommendations of the agroclimatic bulletin (Figure 16). This suggests that, in some farms and plots of families, or organizations and institutions, they have begun to make changes in their production practices, considering the predictions of the forecasts and the recommendations provided in the bulletins. At the Latin American level, evidence of changes in production practices has been generated from the information received in the MTAs, such as, for example, the variation of planting dates, and the prevention of pests according to climate variability, among others (Giraldo-Mendez et al., 2019).

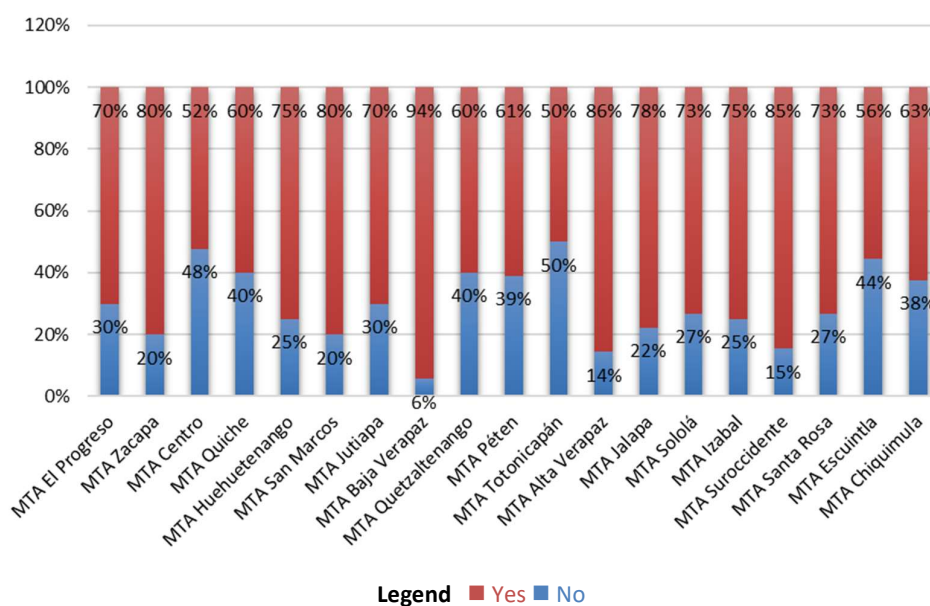


Figure 16. Results on the application of the recommendations of the agroclimatic bulletins.

The usefulness of the information from the agroclimatic bulletins varies according to the region of the country in which each MTA is located (Figure 17). In the

northwestern region (Huehuetenango and Quiché), the information has been more useful for preventing risks, disasters, frost, strong winds, and extreme rainfall in their agricultural practices. For the southwestern region (San Marcos, Quetzaltenango, Totonicapán, Sololá, and Suroccidente) it has been more useful for crop planning, such as the choice of planting date, fertilizers, varieties, etc., crop management and risk prevention and disasters.

In the eastern part of the country (Izabal, Zacapa, Chiquimula, El Progreso, Jutiapa, Jalapa, and Santa Rosa), mainly in the well-known dry corridor (Zacapa, Chiquimula and El Progreso), it has been more useful for crop planning and management. In the rest of the east, they have focused more on crop management and optimization of resources or on avoiding possible losses that weather conditions may generate. In the central region (Guatemala, Sacatepéquez, Escuintla, and Chimaltenango) it has been used more to prevent frost, mainly in the departments of Guatemala, Sacatepéquez, and Chimaltenango, which are colder areas. While Escuintla has used it more for crop planning, being an area located in the Pacific (climatic regionalization).

The MTA of Baja Verapaz and Alta Verapaz (northern region) have been used for most of the options, that is, for the management and planning of crops, risk prevention, disasters, frosts, and extreme rains, among others. Lastly, the Petén table (Petén region) has used the information mainly for crop planning and management. It is important to remember the wealth of microclimates that the country has and the climatic regionalization that it has (8 regions, see Annex 2).

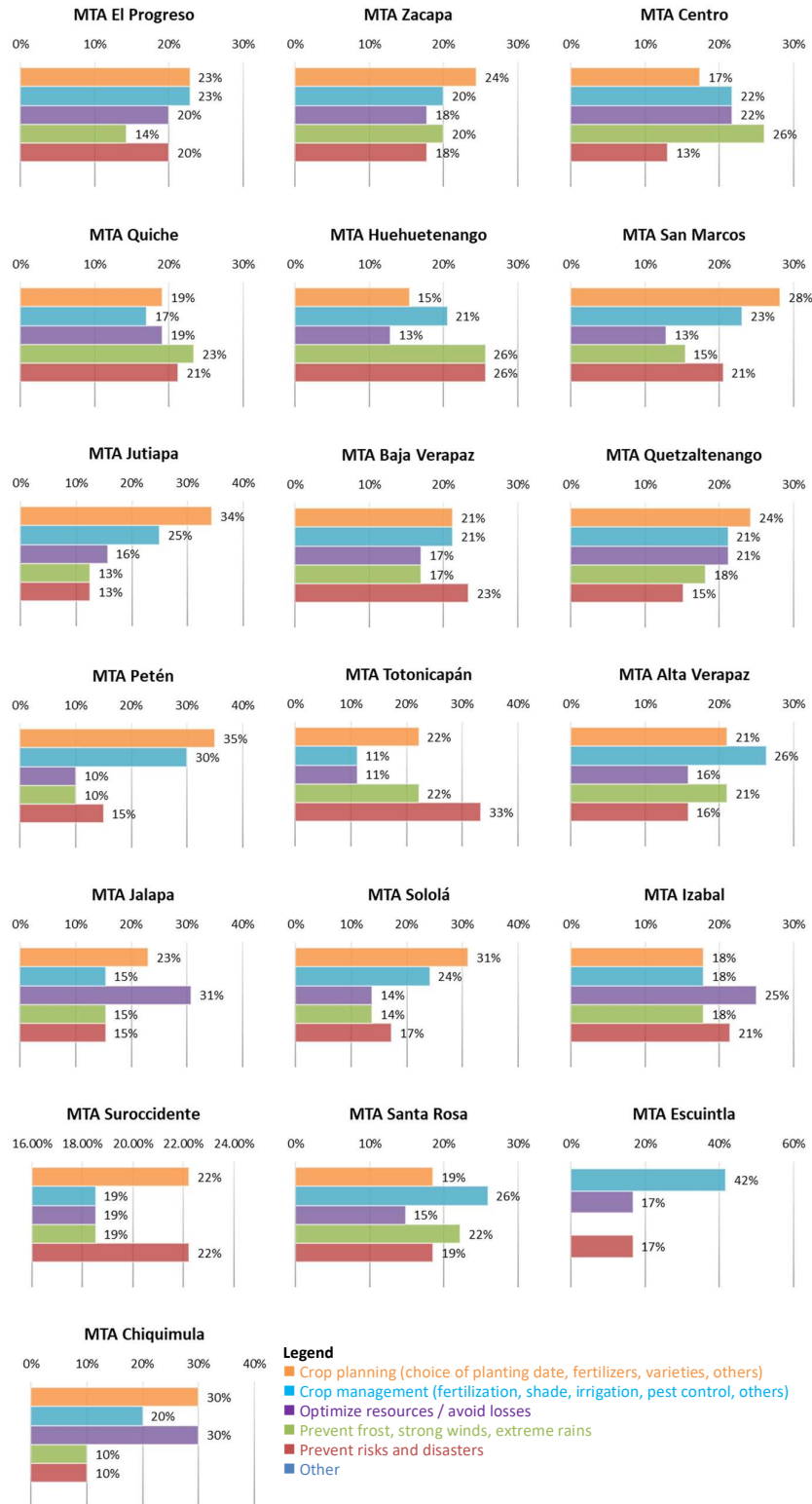


Figure 17. Results on the usefulness of the information from the agroclimatic bulletins.

Limitations in the application of the recommendations

As previously observed (Figure 17), most of the participants applied the recommendations of the last agroclimatic bulletin. It is important to remember that there are limitations related to the application of these (Figure 18). Except for the Center MTA (composed of Guatemala, Sacatepéquez, and Chimaltenango departments) and Izabal, whose main limitation is the lack of time, the participants of the other tables stated that it was due to the lack of financial resources (89% of the tables).

The second most important limitation is the lack of time to implement the practices or recommendations provided in the bulletins and 47% of the tables indicated that they did not have any type of limitation. Limitations such as lack of relevance of the recommendations and/or lack of understanding were more present in the Western MTAs. This is an opportunity to continue training and training the attendees, due to the lack of understanding of technical terms in some cases. The limitations identified as other, with less representativeness in the committees, refer mainly to the cultural and generational changes involved in implementing other types of agricultural or livestock practices.

It is considered that confidence in the information presented in the MTAs is progressive as farmers verify that the recommendations are designed with good judgment, contextualized to their areas and that they can support them to reduce losses or increase productivity.

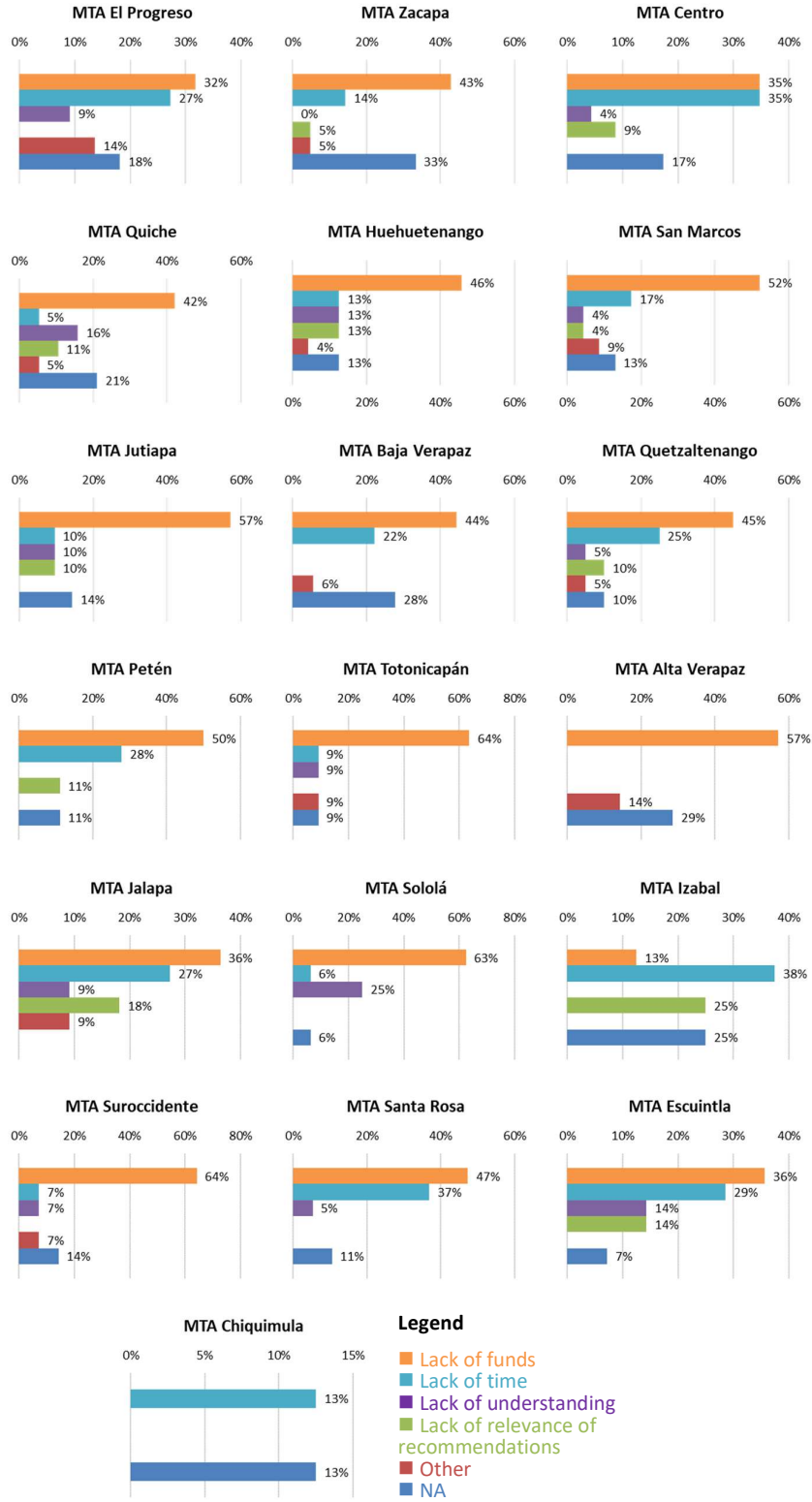


Figure 18. Results on the limitations in the application of the recommendations.

Means by which the Agroclimatic Bulletin is received and disseminated

With the advantage of using digital media and increasing availability in Guatemala, 100% of the people interviewed received the agroclimatic bulletin through digital media (Figure 19). Only Zacapa, Quiché, El Progreso, Quetzaltenango, and Centro receive information through print media. 3% of the people surveyed stated that they do not receive the information by any means, mainly because they are not part of the MTA WhatsApp group, which is an invitation to continue updating the lists and dissemination groups.

It is important to mention that 4% of the people have received the information through meetings or workshops and it was calculated that no person has listened to the radio spots that have been generated in the tables of Petén, Izabal, El Progreso, Zacapa, Quiché, San Marcos, Suroccidente and Santa Rosa. In Guatemala, 42% of the population has access to the Internet³ and the use of mobile devices is 70.4% in rural areas⁴. This proves why digital media are preferred to disseminate MTA information, as indicated by 66% of those surveyed (Figure 20), however, despite being an efficient medium, not all farmers have access to these media. Therefore, 14% prefer to disseminate through meetings or workshops, in which they use terms understandable to farmers.

³ <https://ilifebelt.com/cuantos-usuarios-de-facebook-hay-en-guatemala-datos-2018-2019/2018/11/>

⁴ <https://www.estrategiaynegocios.net/inicio/766276-330/guatemala-80-de-poblaci%C3%B3n-cuenta-con-servicio-celular>

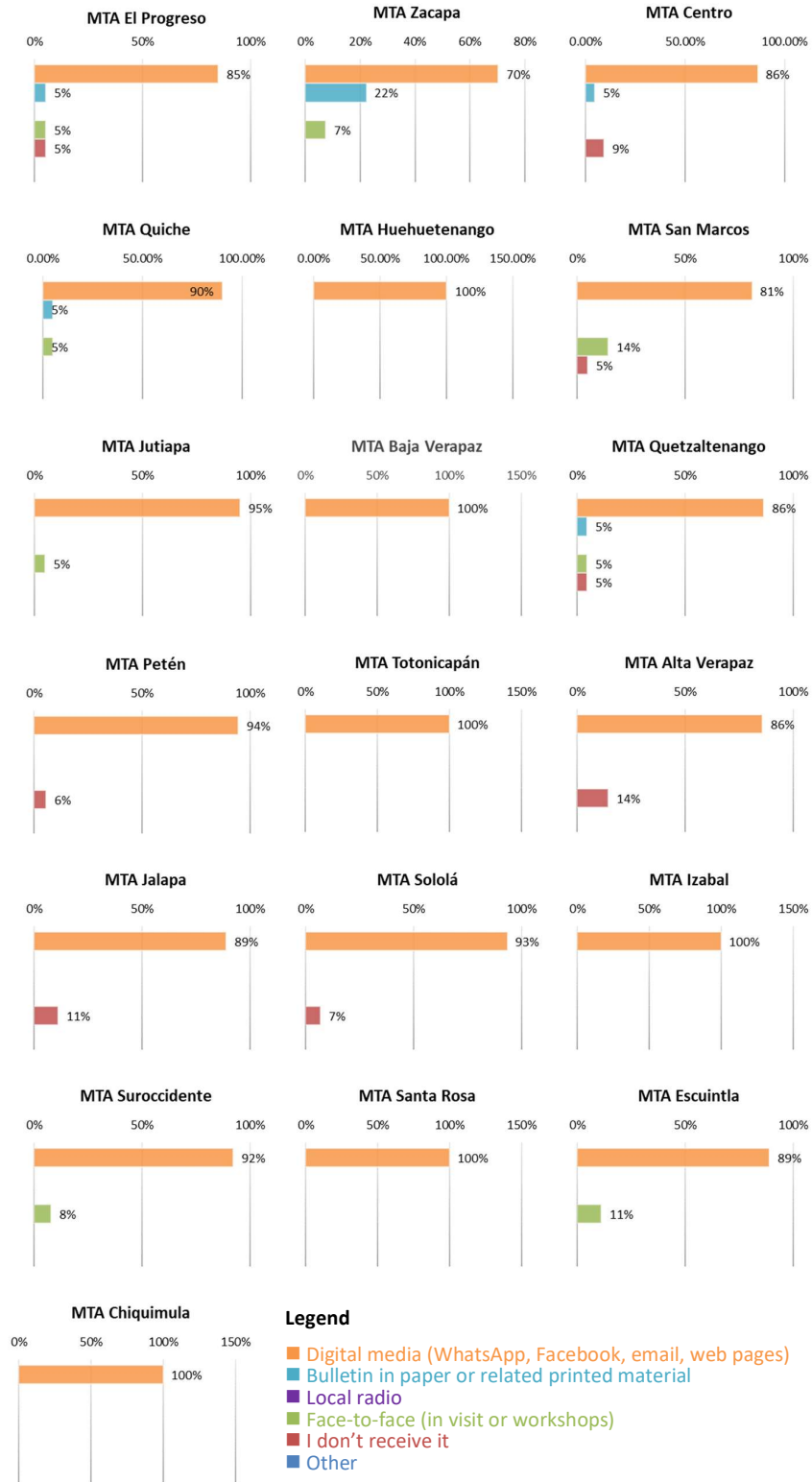


Figure 19. Results on the means of dissemination by which people receive the agroclimatic bulletins.

Other people prefer to spread the bulletin through printed material or radio spots, such as the tables of El Progreso, Quiche, Zacapa, Huehuetenango, Baja Verapaz, Quetzaltenango, Totonicapán, Alta Verapaz, Izabal and Suroccidente. It is important to mention that there are organizations or institutions at the MTA that participate but do not disseminate the information.

Although the COVID-19 pandemic changed the flow of communication and work dynamics in many aspects, most of the tables, except the one in Centro and Jalapa, agree that the media with the greatest potential to be used in the dissemination of information is the written media (e.g., trifoliate) and local radios (Figure 21), loudspeakers or capsules on the local cable, to reach more people. They also mentioned the importance of translating the bulletin into mother tongues.

Digital media will continue to be one of the main means of agroclimatic dissemination due to its valuable potential and for being a means that is already recognized for accessing this type of information.

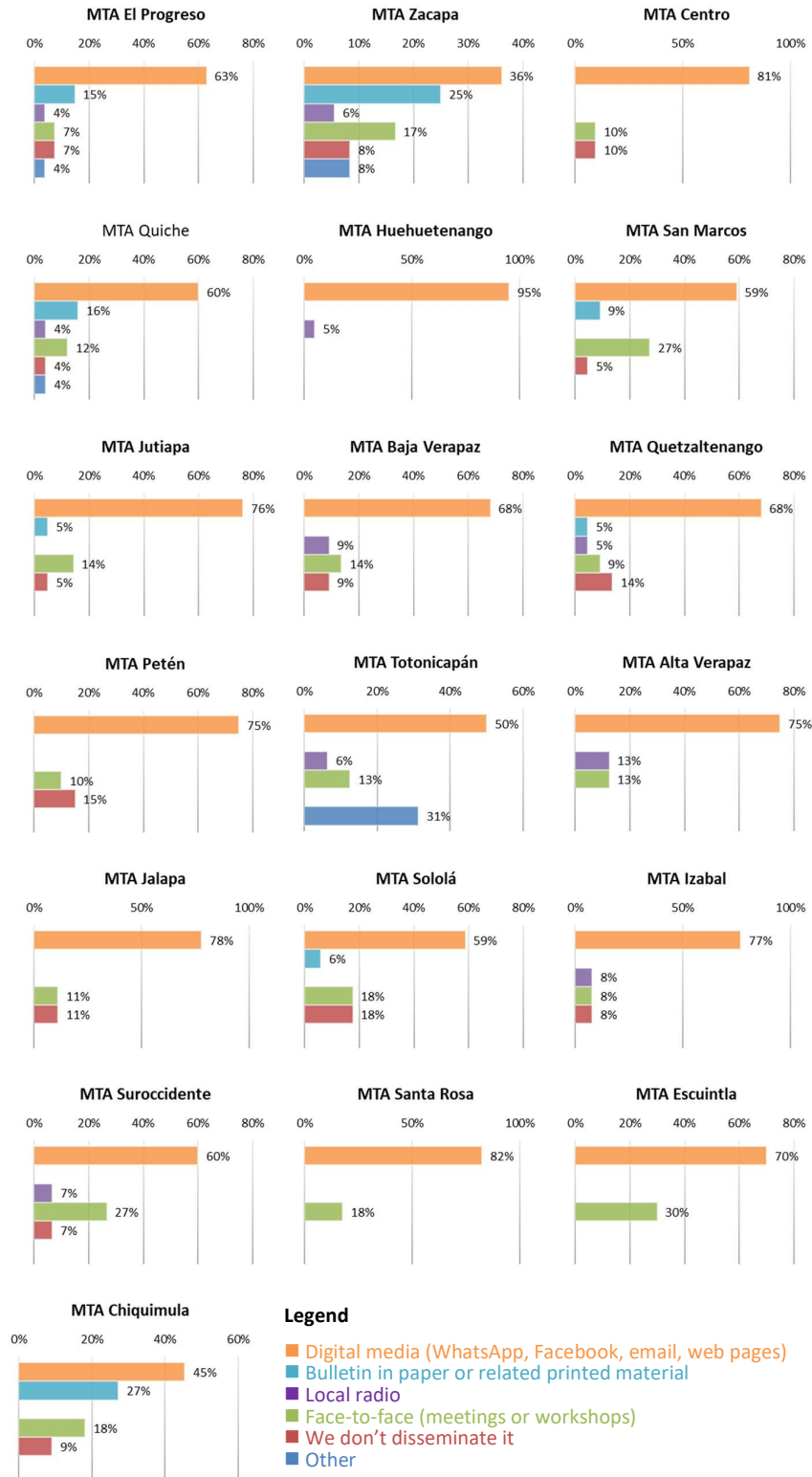


Figure 20. Results on the media used to disseminate the bulletins.

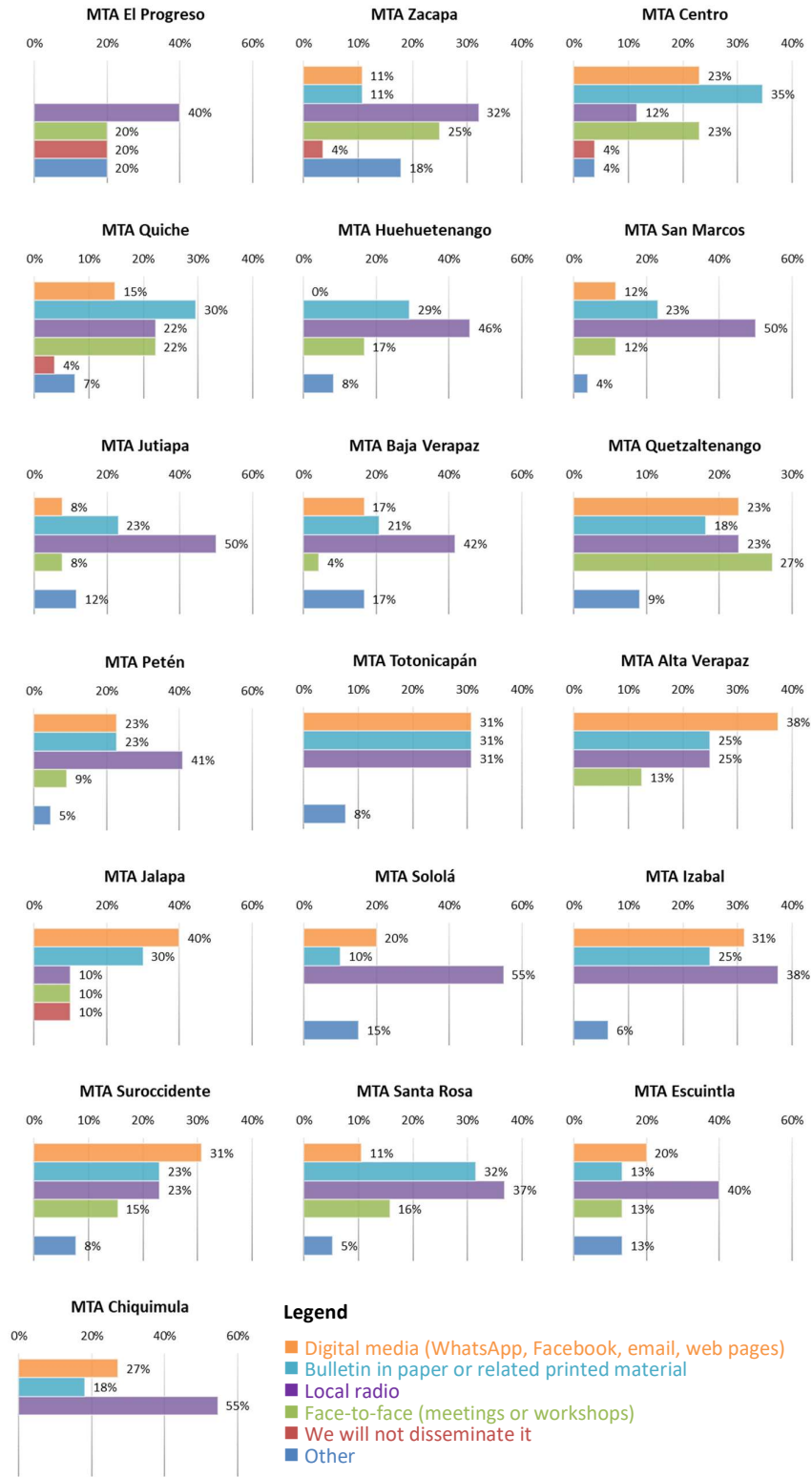


Figure 21. Results on how people could potentially disseminate agroclimatic bulletins.

Suggestions

About MTAs meetings

Suggestions from MTA participants about meetings are varied. Part of the respondents indicated that they have no suggestions to improve the dynamics of the meetings. The most common suggestions among the participants are: to hold more participatory meetings with a greater presence of farmers and institutions (e.g., private, local governments, academia, etc.), that the meetings can be held more continuously, more organized (e.g., carry out the call and socialization of the agenda with more time), in person, more concrete and that is rotating in the region. The information provided is more understandable, and simple and can be provided in the native languages, so the participation of experts and field technicians be considered to generate more specific and sector-specific recommendations. Another recurring frequency was to carry out field days in which the information is brought to the farmers, reaching their communities.

Another group of people expressed the importance of following up on agroclimatic bulletins, generating and sharing meeting minutes, and improving how information is disseminated. A concern expressed by several was the high turnover of participants at the tables, which is why they recommend that the actors be able to participate more constantly and that training topics continue to be provided.

Table 3 shows the aforementioned recommendations and some additional ones indicated by the participants.

Table 3. Suggestions proposed by the participants on the development of the meetings in the MTAs.

Participation of farmers to better reach the farmer and consider the issue of languages.	Include people of the mother tongue.
Hold face-to-face meetings and hold them more often.	Have general information for everyone.
More intervention by the INSIVIUMEH to emphasize the interpretation of the bulletins, maps, and synopses that go up, since the information is not understandable.	Promote the participation of all stakeholders in the livestock area.
More participatory meetings.	Have more time for the subject of education.
Reduce the time of the maps to carry out the bulletin.	Incorporate more people.
Take the initiative to visit the communities to give them the information from the bulletins.	Be done more frequently.
Extraordinary meetings to provide prevention measures for events such as hurricanes.	Be more constant and provide support material to disseminate the information.
Have the participation of private companies and farmers.	Hold meetings regionally.
Have qualified personnel to give the talks.	More participatory and recreational.
Make a community of the upper part of the department to know the perspective of the other municipalities.	Give more specific recommendations for each crop.
Extend the time for recommendations.	Hold more regional meetings, by areas of the department (upper and lower area).
Field visits to understand the work of the farmer.	Hold rotating meetings in all the municipalities of the department.
At the level of the different ministries give precise instructions for the direction of the table.	Work minutes and send them to MTA participants.
Give more emphasis to the forecast part and give recommendations immediately.	Keep track of meetings.
Include more people who are experts in crops in the area to give training.	Schedule more time for meetings.
The people who participate in the MTA do not move them so that there is a continuation.	To be more participatory on the part of the technicians.
Continuation of the entities that are participating so that the project is not privatized.	Involve municipalities.
Face-to-face meetings to resolve doubts in a better way.	Law for public institutions to attend.
More participatory in the preventive measures that must be taken.	Suggest topics to give at meetings.
Have funding to hold meetings with the necessary resources.	Carry out joint actions with the different institutions.
Take everyone into account to send information about future meetings.	Participation of different actors such as farmers.
Take into account the climatic conditions of each region or locality.	Participation in institutions related to agriculture.
Improve meeting times and implement an evening meeting.	Include more institutions that commit to the MTA.
Participation of farmers to better reach the farmer and consider the issue of languages.	Involve more institutions and cooperatives.
More intervention by the INSIVIUMEH to emphasize the interpretation of the bulletins, maps, and synopses that go up, since the information is not understandable.	Include farmers in meetings.
Make it more participatory.	Carry out field visits.
Active participation of the participants.	Approach other institutions to participate in the MTA.
	Include more sectors.
	Hold meetings in different municipalities of the department.
	Rotate the meetings in all municipalities to have the participation of other stakeholders.
	Deal with agricultural issues such as soil, not just focus on climate.
	Strengthen decentralization.
	Hold more punctual and objective meetings. Have better participation in civil society and academia.
	Disseminate more by other institutions so that the information reaches other people.

<i>Carry them out in the department of Baja Verapaz.</i>	<i>Have the participation of producers from the area.</i>
<i>Make a call where more people are invited.</i>	<i>Hold meetings more frequently.</i>
<i>Option to hold the meeting in person and online at the same time.</i>	<i>Do not change the actors constantly, since at each meeting they change actors.</i>
<i>Do not do them so long, but do them more frequently.</i>	<i>Participation of all members and keep the same people who have been participating in the MTA.</i>
<i>Hold regular meetings.</i>	<i>Invite leading community producers.</i>
<i>Rotate the meetings in the different municipalities of the department.</i>	<i>Make a call to all institutions related to agriculture and have constant participation of institutions related to climate.</i>
<i>Focus more on farmer participation.</i>	<i>Have the constant participation of all the actors.</i>
<i>Hold meetings in the different municipalities of the department.</i>	<i>Include farmers.</i>
<i>Conduct community participation.</i>	<i>Continue with the initiative.</i>
<i>The synergy between government institutions and carrying out planning with more time.</i>	<i>Look for the leaders and representatives to deliver the information of the MTA.</i>
<i>Rotate the meetings in the different municipalities.</i>	<i>Hold meetings more regularly</i>
<i>Make the calls for meetings on time.</i>	<i>Designate more comfortable places to hold meetings.</i>
<i>Classify the information by type of farmer and by crop.</i>	<i>Have more funds to be able to carry out the activities, to be able to expand the calls.</i>
<i>Improve adaptation methods so that people can adapt to their environment,</i>	<i>To be carried out in a sectorized way.</i>
<i>Streamline meetings with those in charge of the municipality.</i>	<i>Carry out more training based on the prevention of crop damage.</i>
<i>Consider more the experience of the technicians of each department.</i>	<i>Share the agenda days before and share a document.</i>
<i>Identify some other sectors or regions so that the information is more accurate.</i>	<i>Share information from other institutions and carry out activities in the field.</i>
<i>Hold face-to-face meetings again.</i>	<i>Hold meetings in person.</i>
<i>Invite specialists from each crop.</i>	<i>Include livestock issues</i>
<i>Send information from the technical tables closest to the region. Have MTA meetings Monday or Friday.</i>	<i>Participation of the elements of the department.</i>
<i>Include farmers in meetings.</i>	<i>Be more participatory.</i>
<i>Facilitate the materials to be able to disseminate with the farmers.</i>	<i>Continue holding hybrid meetings.</i>
<i>Send information more frequently.</i>	<i>Give practical and easy-to-understand recommendations in meetings.</i>
<i>Strengthen support for communities to reduce the vulnerability of crops.</i>	<i>Surveys to see the meeting schedule.</i>
<i>Motivate the people who are part of it.</i>	<i>Hold meetings at the municipal level.</i>
<i>Involve more community actors and producers.</i>	<i>Perform in person.</i>
<i>Hold more workshops on how to apply the bulletin recommendations and how to better understand the bulletin.</i>	<i>Take into account all the extension workers and carry out field visits.</i>
<i>Involve municipal authorities.</i>	<i>Support in the management of information through the media.</i>
<i>Make the meetings not so extensive.</i>	<i>Guarantee the participation of institutions related to agriculture.</i>
<i>Include more relevant farmers in the crop area.</i>	<i>Follow up on newsletters.</i>
<i>Make it shorter and more specific with certain topics.</i>	<i>Incentivize producers more.</i>

About the Agroclimatic Bulletin

The suggestions shared by the MTA participants about the agroclimatic bulletin were similarly varied. A group of people indicated that they would not add anything to the newsletter. However, some of the suggestions that people expressed are: use simpler language for understanding, add more graphs that can facilitate the interpretation of climate information, add recommendations for the livestock sector (e.g., cattle, pastures, forages, etc), include pathological information, pests and diseases and more specific recommendations by crop and geographical area.

In addition, they mentioned the importance of being able to add crop recommendations according to the vocation of the soil and climatic conditions, create and include infographics or more graphic material for better interpretation, agronomic advice, market situation (e.g. fertilizer prices), add more information about food security and prevention of risks and disasters, adding the experience of farmers when carrying out certain practices or changes in their production systems and the translation of the material into their mother tongues.

Other interesting data that they mentioned can be included are graphs with the rainfall history of previous years, river levels, evapotranspiration data, and the use of more inclusive language. Some suggestions are named here and additional ones are shown in Table 4. Examples of agroclimatic bulletins are shown in Annex 3.

Table 4. Suggestions proposed by the participants on the development of agroclimatic bulletins.

<i>Suggested crops and information on soil vocation.</i>	<i>Information on pests and diseases of crops in the area.</i>
<i>Place the current situation and behavior of atmospheric phenomena in the region</i>	<i>Generate the information in the form of leaflets to make it more understandable for farmers.</i>
<i>Return less technically the forecasts for farmers.</i>	<i>Place more information on the department since many times it is done at the regional level.</i>
<i>Approximate or close dates for planting, harvesting, and storage of crops.</i>	<i>Be more specific on issues for farmers.</i>
<i>Recommended crops for each season.</i>	<i>Specification by areas of the department.</i>
<i>More information is in the maps sent.</i>	<i>Information according to the areas of the department.</i>
<i>Stick to the reality of farmers.</i>	<i>Relate the climatic conditions with the crops of the region.</i>
<i>Areas vulnerable to any phenomenon</i>	<i>Make leaflets with summarized information for farmers.</i>
<i>Include maps of agricultural areas at the departmental level.</i>	<i>Livestock area.</i>
<i>Recommendations on food safety.</i>	<i>Reinforce the livestock issue.</i>
<i>Put the information in understandable terms for farmers.</i>	<i>Have information from municipal groups.</i>
<i>Include and combine climate information with thematic maps such as land cover and land use.</i>	<i>Hold different meetings in each municipality of the department because the crops are different in each area and the recommendations are regional. Include livestock issues.</i>
<i>Make the bulletin understandable for farmers.</i>	<i>Be more punctual in crop planning issues.</i>
<i>Make newsletter infographics for social media to share with farmers in the area.</i>	<i>More information on pests and diseases.</i>
<i>Include issues of phytopathology, and diseases, that do not only subscribe to the agroclimatic issue.</i>	<i>More reliable precipitation data.</i>
<i>Important pest information.</i>	<i>Recommendations for the livestock area.</i>
<i>Market situation.</i>	<i>Suggestions on livestock.</i>
<i>Selection of techniques that serve the farmer and recommendations that are accompanied by agronomic issues. Agronomic tips.</i>	<i>Place recommendations for the livestock area.</i>
<i>Information on prevention techniques.</i>	<i>Projections of the effect of planting crops by departments.</i>
<i>Recommendations for crops in each area.</i>	<i>Expected average rainfall with more understandable terms for the farmer.</i>
<i>Fertilizer prices.</i>	<i>More specific information on the phenological stages of crops.</i>
<i>More information on the diversity of crops in the region.</i>	<i>Post farmers' experiences.</i>
<i>Carry out an analysis based on each region or area of the department.</i>	<i>Information on thematic maps provides information in real-time and INSIVUMEH post all climate records in real-time on the web page since the information must be provided to the public.</i>
<i>Translations into the mother tongue.</i>	<i>Add more graphics to improve farmers' understanding.</i>
<i>Add more pictograms to make it more understandable for the farmer.</i>	<i>Add contact information.</i>
<i>Rain dynamics.</i>	<i>More graphic information and generated in the local language.</i>
<i>Place in each bulletin the probability of atmospheric phenomena.</i>	<i>Place more illustrated graphics.</i>
<i>Place detailed information about each municipality, since it comes in a very general way.</i>	<i>Ammunition at key moments of pests and diseases for farmers to prepare for their crops.</i>
<i>Simplify the information for farmers and translate the information into the mother tongue.</i>	<i>Expand the information.</i>
<i>Specific recommendations on crop varieties.</i>	<i>Mapping of the crops that are traditionally grown in the department.</i>
<i>Add more graphics to make it more understandable for farmers.</i>	<i>Better explanation of the maps.</i>
<i>Describe municipalities and communities.</i>	<i>Share the climate history of several years to project.</i>
<i>Agricultural issues.</i>	<i>Information on the temperature is more understandable for the rural population.</i>
<i>More specific information according to the regions of the department.</i>	
<i>Information to manage climate change.</i>	

<i>Frost risks.</i>	<i>Tips or production techniques and new agricultural production techniques.</i>
<i>The long-term expectation on the climate.</i>	<i>Be more focused on the farmer.</i>
<i>Bulletin formats are attached to each region.</i>	<i>Contact information for public servants.</i>
<i>Let it be directly for each region.</i>	<i>Consolidate the information of all the institutions that participate in the MTA.</i>
<i>Conservation of pastures and forages in the summer season and information on livestock.</i>	<i>Have more coverage of weather stations.</i>
<i>Include a special technician for each region.</i>	<i>Include more infographics to have a better understanding of the farmer.</i>
<i>Incorporate the theme of forest fires.</i>	<i>More non-superficial recommendations for each crop according to climate information.</i>
<i>Information about the arachnid plague that is affecting the Olinstepeque area.</i>	<i>Livestock component.</i>
<i>Forecast graphs to provide information to farmers. Agricultural calendars of precipitation and temperatures and topics related to the lunar phases that are still used in agriculture.</i>	<i>Short-term weather conditions.</i>
<i>Information every 3 months for better planning.</i>	<i>Pest information.</i>
<i>Indicate information about atmospheric phenomena.</i>	<i>Inform the monthly changes in the atmospheric weather and the phenomena.</i>
<i>Weather interpretations by region.</i>	<i>Make the bulletin with fewer technical words so that farmers and people who do not speak Spanish well can understand it.</i>
<i>Crops at risk.</i>	<i>rain frequency</i>
<i>River levels, specifically the Salinas River.</i>	<i>Crops that can be planted in each season at certain masl.</i>
<i>Expand the information on the crops.</i>	<i>Upcoming forecasts.</i>
<i>Incidence of heat waves for fire prevention.</i>	<i>Monthly rain forecasts for the coming year.</i>
<i>Information and recommendations of annual crops.</i>	<i>Different species adapt to the climatic conditions of the department.</i>
<i>Information on the climatic stations.</i>	<i>Livestock information.</i>
<i>Doses of chemicals for crops.</i>	<i>Be more specific in the information that appears.</i>
<i>Information on climate change.</i>	<i>Disaster prevention.</i>
<i>Fusion with ancestral knowledge. Simpler and less technical newsletters for farmers. More flashy, with fewer letters and larger graphics for the use of farmers.</i>	<i>Add livestock part.</i>
<i>The cycle of the moon</i>	<i>Include the forest theme.</i>
<i>Experiences of the actors on the recommendations they have put into practice.</i>	<i>Climate change projections, information for farmers.</i>
<i>Make the bulletin with less technical terms for a better understanding of farmers.</i>	<i>Forecast accompanied by research.</i>
<i>Current prices of products for crops according to the region.</i>	<i>Disaster risk areas.</i>
<i>Technical information for farmers.</i>	<i>Concrete recommendations based on climate forecasts.</i>
<i>Place more timely information regarding the weather.</i>	<i>More information about the weather and natural disasters with less technical terms for a better understanding of the farmer.</i>
<i>Information on the millimeters of maximum and minimum rain.</i>	<i>Have a more inclusive language, since it refers more to producers and not to producers.</i>
<i>Forecasts are explained in understandable terms for the farmer.</i>	<i>Where the recommendations they have provided have been better replicated.</i>
<i>Accuracy to climatic states.</i>	<i>Food safety.</i>
<i>Focus on the crops of the different areas of the department.</i>	<i>Do it in a more summarized way so that it is better understood by farmers.</i>
<i>Evapotranspiration data from the previous months.</i>	<i>Pest management.</i>
<i>Prices of agricultural products.</i>	<i>Section with simpler information for the farmer.</i>
<i>Rainfall record of previous years.</i>	

About MTAs coordination

The suggestions given by the participants, as in the previous questions, have been varied, the main ones being: make the call to the MTAs with more time in advance, as far as possible have a calendar with the proposed dates for the people can organize and participate. In addition, updating the contacts that exist in the WhatsApp groups, keeping track of the participants, being more active and following up on the board of directors, decentralizing coordination, supporting the leadership of the institutions, and seeking financial support to be able to develop the meetings.

Some of the suggestions they made have already been implemented in the tables, such as the formation of the different committees and the exchange of experiences between tables, this is an opportunity for improvement and to continue with the work that has been done.

The suggestions named by the respondents are shown in Table 5.

Table 5. Suggestions proposed by the participants on the coordination of the MTAs.

<i>Update group information because there are people who are no longer working in the same places and are still in the groups.</i>	<i>Include governmental and non-governmental actors that are directed by MARN for the issue of climate change.</i>
<i>Call on institutions and academia to join the agroclimatic technical table.</i>	<i>Maintain constant communication.</i>
<i>Give continuity to the former board of directors and be more active. Exchange of experiences with other tables in the territory.</i>	<i>Improve the coordination of the participatory entities, so that they all handle the same information.</i>
<i>Invite more agronomists from other entities to participate in the table.</i>	<i>Convey information to farmers.</i>
<i>Active participation of key actors.</i>	<i>Keep better control of the people who participate in the MTA.</i>
<i>Involve government institutions such as MARN, CONRED, and CONAP since their participation is not constant.</i>	<i>Change of meeting time.</i>
<i>Conduct awareness training workshops for people.</i>	<i>Send invitations ahead of time to attend the MTA.</i>
<i>Improve the support and leadership of government institutions.</i>	<i>Have more constant meetings and send the information of each bulletin in advance</i>
<i>Start MTA meetings at the indicated time.</i>	<i>Greater communication.</i>
<i>Involve more people and have more support from the institutions involved.</i>	<i>Take into account all those involved in the meetings.</i>
	<i>Make an activity calendar.</i>
	<i>The information reaches the municipal coordinators directly.</i>

<i>Send the direct invitation to the municipal extension agents.</i>	<i>Hold extraordinary meetings of managers.</i>
<i>Socialize through WhatsApp to give the information.</i>	<i>Have more economic funds to carry out more activities with farmers.</i>
<i>Hold meetings in the evening.</i>	<i>More participation of the institutions involved.</i>
<i>Standardize the documents to make posters.</i>	<i>Make the call in advance.</i>
<i>Have the whole team in the meetings to be able to handle all the information</i>	<i>Have greater participation of government entities.</i>
<i>Take all the extension agents into account to have a better understanding of the topics so that everyone can have a sequence of the topic.</i>	<i>Make a call one month in advance and a reminder a few days before.</i>
<i>Hold meetings in different parts of the department and make field visits.</i>	<i>Greater relationship between coordinators and participants.</i>
<i>Better planning of the call.</i>	<i>Make the call in advance, and be more punctual in the topics that will be given.</i>
<i>Send invitations to everyone who has been participating in the MTA</i>	<i>That all the actors have some role in the coordination so as not to overload the organizers.</i>
<i>Make the MTA meeting invitation in advance.</i>	<i>Integration of the coordinator to carry out the meetings.</i>
<i>Always be present with the same actors.</i>	<i>Be consistent with the people who participate in the MTA and give the next date of the Meeting in advance and remind it constantly.</i>
<i>Create a technical committee for MTAs.</i>	<i>Include leaders at the departmental level.</i>
<i>Hold face-to-face meetings</i>	<i>Better coordinate extension workers to hold MTA meetings.</i>
<i>Committee formation.</i>	<i>Extend the time of the meetings to resolve all doubts.</i>
<i>Create a calendar of annual meetings.</i>	<i>Respect the lines of authority of each department.</i>
<i>Give more publicity to the MTA and take local authorities into account.</i>	<i>Carry out meetings in a hybrid way.</i>
<i>Stronger advocacy by MAGA with other institutions</i>	<i>Make more formal calls for meetings.</i>
<i>Send the call in advance.</i>	<i>Perform more dynamically.</i>
<i>Keep the coordinators of the MTA.</i>	<i>Continue taking into account different institutions and associations.</i>
<i>Involve department heads.</i>	<i>More commitment from government institutions.</i>
<i>Do it more often.</i>	<i>Have more support from NGOs and other government institutions for financial support.</i>
<i>Decentralization of MAGA coordination.</i>	<i>Perform them in different areas of the department.</i>
<i>Carry out municipal MTAs and break the scheme that the MTA remains state-owned and less political</i>	<i>Hold meetings more regularly.</i>
<i>Hold meetings by the municipality.</i>	<i>Make the invitation to other institutions that are related to agriculture.</i>
<i>Greater communication between institutions.</i>	<i>Include MARN in the technical table.</i>
<i>Cover more people and institutions.</i>	<i>Establish a schedule for meetings and hold meetings in different municipalities of the department. Expand the space for new institutions.</i>
<i>Get closer to municipal leaders.</i>	<i>Do it biweekly.</i>
<i>That the immediate bosses support more so that everyone can participate in the MTA.</i>	<i>Give refreshment</i>
<i>Hold two monthly meetings, one in person and one virtually.</i>	<i>Identify and convene other actors.</i>
<i>Provide phone numbers of MTA actors.</i>	<i>Make the call to different institutions to participate in the meetings.</i>
<i>Make a call for more farmers to attend.</i>	<i>Hold meetings more regularly.</i>
<i>Improve the harmony between the institutions and make it so that the producers can receive the information.</i>	<i>Notify by mail of the call for the meeting.</i>
<i>Schedule annual dates for meetings to have everything on schedule.</i>	<i>Cover the departmental heads of other government institutions that have a presence in the department and are related to the issue.</i>
<i>Debug the chats, because people who are no longer part of them appear.</i>	<i>Make a reminder of the Meeting by email.</i>
<i>Identify the roles, and differentiate the national, local, and municipal levels.</i>	<i>Place a weather station in the municipality of Masagua.</i>
<i>Increase the performance of CADER group associations.</i>	<i>Improve the call for meetings.</i>
<i>Identify each of the coordinators of the technical table.</i>	<i>Make the call to other institutions related to the subject.</i>
<i>Include more local actors in the area.</i>	

<i>Make a call at a prudent time.</i>	<i>Greater coordination within the technical council of the MTA.</i>
<i>Make a call to farmers at the departmental level.</i>	<i>Make a call to institutions that are related to the agricultural sector.</i>
<i>Count on more funding as the MTA has already exceeded expectations.</i>	<i>To have better coordination on the part of the participating institutions.</i>
<i>Technical support with more specialists in the subject.</i>	

Conclusions

Continuous monitoring and evaluation are necessary for the proper development of climate services in Guatemala, particularly for the Local Technical Agroclimatic Committees. In Guatemala, there has been a rapid escalation of the MTAs, currently covering 100% of the national territory with 19 MTAs and the participation of more than 100 institutions.

The monitoring and evaluation process is important to identify how effective the working groups have been, strengths, challenges, and barriers they face for the co-production, transfer, translation, and use of information by farmers in the communities, especially in rural areas. Some important findings that result from the application of the monitoring and evaluation instrument in Guatemala during the last quarter of 2022 can be highlighted:

- In the MTAs, most of the participants are men and identify themselves as ladinos, except in the West, where women have greater participation and there is a greater presence of the indigenous population at the tables. This reminds us that the MTA is a space in which it is possible to continue contributing to social inclusion in aspects such as access to information and the representativeness of diverse peoples.
- The presence of public sector institutions (e.g. ministries, secretariats, etc.) predominates in the MTAs. Despite this, there is good participation from various sectors and institutions, especially from the productive agricultural

sector, which is in direct contact with farmers. All participating institutions have gender and/or youth inclusion programs.

- Basic grains and vegetables are the main agricultural system in the MTAs. The most recurring problems of climate variability are prolonged droughts or heat waves and the erratic behavior of rain.
- The perception of the quality of the climatic information concerning the accumulated rainfall at the beginning and end of the rainy season is good. The degree of understanding of climate information is classified as very understandable and more than half of the participants indicated that their climate knowledge and interpretation of the forecast has increased significantly since attending the MTAs.
- The agroclimatic bulletins are a tangible product of the MTAs. Per committee, they are shared on average with more than 300 farmers through digital media (e.g. WhatsApp groups). While the bulletin is shared directly with up to 50 farmers per committee.
- Some of the institutions that make up the MTAs are working on identifying the most appropriate way to disseminate information to producers and the general public. This can be done through means of common access for rural families, such as the radio. At present efforts have been made to produce radio capsules that are disseminated through local radio stations.
- More than half of the participants have implemented or suggested some recommendations from the agroclimatic bulletin. The utility varies depending on the region, for example, in the west of the country, it has been more useful

due to frost, strong winds, and extreme rains, among others, while in the east of the country it has been more useful for planning and management of crops. The main limitation to applying the recommendations is due to the lack of financial resources.

- Agroclimatic bulletins are received mainly through digital media (e.g. WhatsApp groups). Institutions use digital media, meetings, workshops, printed material, or radio capsules to disseminate information. Some of the means that they suggest can work to better disseminate the bulletins correspond to written media (e.g. trifoliate), use of local radios as mentioned above, loudspeakers, and information capsules on local cable stations.
- The most common suggestions about MTA meetings are that they are more participatory, that they have a greater presence of farmers and institutions, and that they are held face-to-face and in rotation by the different municipalities or departments that comprise it.
- Regarding the agroclimatic bulletin, the suggestions coincide in using simpler language for its understanding, using more graphic materials to facilitate the interpretation of the information, including more recommendations from other productive sectors (e.g., livestock) and information on pests and diseases.
- Regarding the coordination of the MTAs, the main suggestions are to make the call with more anticipation, to give more support to the leadership of the different institutions that support the committees and boards of directors, as well as to seek financial support to be able to develop the meetings in a better way.

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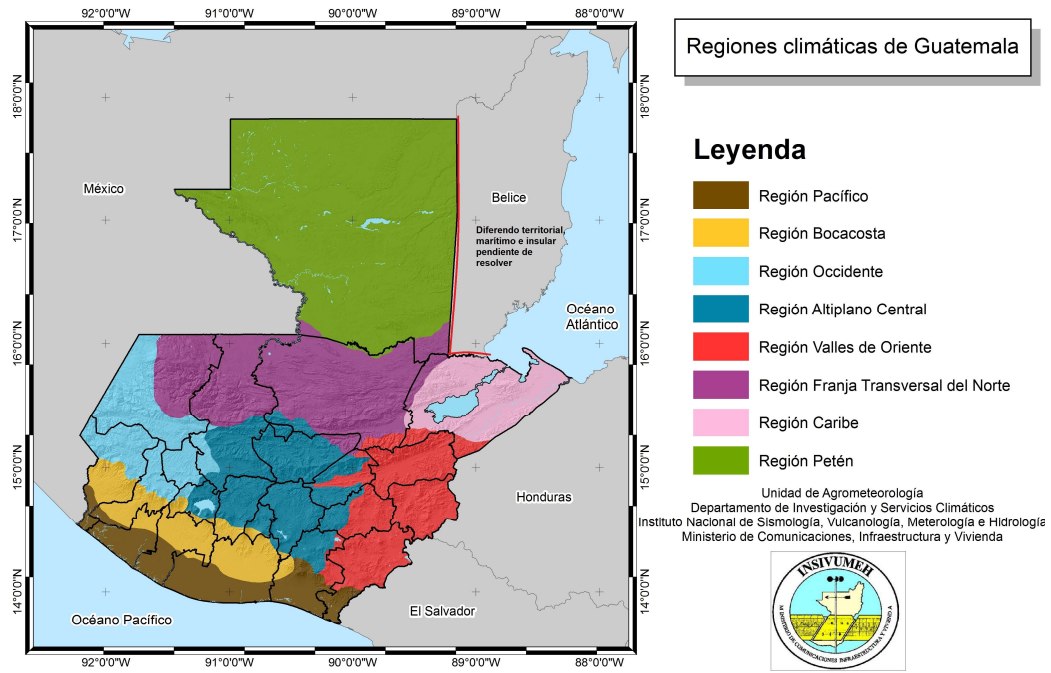
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Annex 2. Climatic regions of Guatemala



Source: National Institute of Seismology, Volcanology, Meteorology, and Hydrology (INSIVUMEH).

Annex 3. Examples of agroclimatic bulletins from Guatemala

**MESA TÉCNICA AGROCLIMÁTICA
CENTRO
VERSIÓN TÉCNICA**

BOLETÍN AGROCLIMÁTICO
Agosto, Septiembre y Octubre 2022
Edición No. 11

Anacafé
Asociación Nacional de Cafetaleros de Guatemala

GOBIERNO DE GUATEMALA
Ministerio de Agricultura, GANADERÍA Y FORTALECIMIENTO RURAL

CRIT
Centro de Investigación y Tecnología Agropecuaria

CONDICIONES ESPERADAS PARA GUATEMALA

PERSPECTIVA CLIMÁTICA ASO 2022

La perspectiva climática para el período agosto-septiembre-octubre (ASO) de 2022, fue presentada en el LXIX Foro de Ciencia de Análisis Climático llevado a cabo los días 20-22 de julio de 2022. Para Guatemala la perspectiva es desarrollada por INSVUAMH.

AÑOS ANÁLOGOS
(condiciones similares a ASO 2022)
2011, 2012 y 2017

El estado actual se de condiciones La Niña. Según los modelos de ENSO, se espera con mayor probabilidad un escenario de condiciones de La Niña para el trimestre ASO-2022.

Agosto: Según análisis de precipitación puntual, se espera que la duración de la sequía en 2022 sea menor al período normal en comparación con la duración climatológica 1991-2020. Se anticipa que la central de la región muestra entre el 05 al 24 de agosto.

Septiembre: Las lluvias de septiembre y octubre se esperan a lluvias locales, en poco cantidad de zonas del este, al acercamiento y al cambio en status de la Zona de Convergencia Intertropical (ZCI), estas condiciones favorecen a que puedan presentarse días con abundantes nubes altas, tormentas y lluvias intermitentes.

Octubre: En la segunda quincena de octubre se espera la llegada de viento fro del Norte, asociado al desplazamiento de sistemas de bajas presiones (sistemas como frentes fríos).

Tomar en cuenta que el trimestre agosto-octubre es el más húmedo del año generalmente alcanza el acumulado más alto en el mes de septiembre con algunas excepciones.

PRONÓSTICO DE PRECIPITACIÓN DE ASO 2022

Según el análisis de años análogos y pronóstico estacional de modelos se elabora el mapa de categorías de precipitación.

CATEGORÍA	REGIÓN
Arriba de lo normal (Lluvias por encima de lo que se espera en la climatología 1991 a 2020).	Frango Transversal del Norte, oeste de Peten, norte y sur de Alta Verapaz, norte y oeste del Altiplano Central, oeste y sur de las zonas de Occidente y Pacífico.
Normal (Lluvias que se encuentran dentro de las fluctuaciones regulares en la región, según la climatología de 1991 a 2020).	Centro, este de Peten, norte de Valle de Guatemala, oeste del Altiplano Central, suroeste de Occidente.

Para más información sobre pronósticos y alertas, por favor remitirse a las boletines emitidos por INSVUAMH en su página: www.insvuamh.gob.gt

CALENDARIOS AGRÍCOLAS

Calendario agrícola (maíz), trópico, humedad favorecida

VARIEDAD/SEBIDO	AGOSTO	SEPTIEMBRE	OCTUBRE
ICTA HIB-83			
Primera Cosecha			
Período crítico de monitoreo			
Segunda Cosecha			
Período crítico de monitoreo			
ICTA B-7			
Primera Cosecha			
Período crítico de monitoreo			
Segunda Cosecha			
Período crítico de monitoreo			
ORCULLO (ARROZ)			
Primera Cosecha			
Período crítico de monitoreo			
Segunda Cosecha			
Período crítico de monitoreo			

Calendario agrícola (trigo) trópico, humedad favorecida

VARIEDAD	AGOSTO	SEPTIEMBRE	OCTUBRE
ICTA USERO			
Primera Cosecha			
Período crítico de monitoreo			
Segunda Cosecha			
Período crítico de monitoreo			
VARIAS MICHOLIN			
Primera Cosecha			
Período crítico de monitoreo			
Segunda Cosecha			
Período crítico de monitoreo			

Fuente: FEWSNET. Manuales de campo para la identificación de las etapas de desarrollo del trigo en Guatemala

■ Siembra ■ Germinación ■ Crecimiento I ■ Crecimiento II
■ Fructificación ■ Cosecha ■ Período crítico de monitoreo

COVID-19

Efectos observados

- Falta de recursos afecta a la producción agrícola, interrumpir la agricultura ecológica para fortalecer a las familias que no tienen acceso a insumos agrícolas.

INFORMACIÓN GENERAL

- Monitoreo periódicamente: Actualizaciones del pronóstico emitido mensualmente por el INSVUAMH, así como el pronóstico de corto plazo (de 48-72 horas).
- El Sistema de Monitoreo de Cultivos (DINOPREC) mapa.gob.guatemala.gov.gt
- El Sistema de Monitoreo de Cultivos (DINOPREC) www.insvuamh.gob.gt, que incluye la perspectiva del servicio de alertas, monitoreo de cultivos, calendarios estacionales, disponibilidad de mano de obra, no artificial, etc.
- Resultados de los informes de pérdidas por cosecha del MAGA.
- Resultados emitidos por la mesa de seguridad alimentaria de SESAN.
- Informes de estado de alimentos de la FAO.
- Mapas de alerta emitidos por CENSAH.
- Previsión del Covid-19 para octubre de 2022.

MEDIDAS DE PREVENCIÓN

GUATEMALA NO SE DETIENE

RECOMENDACIONES AGRÍCOLAS

Granos básicos y hortalizas

IMPACTO	OBSERVACIONES (ZONAS)	RECOMENDACIONES
Inundaciones, altas temperaturas, humedad relativa alta.	Todas las zonas	Mantenimiento o establecimiento de acequias y curvas a nivel. Además, realizar aplicaciones preventivas para el control de hongos.
Bajos en la producción.	Todas las zonas	Preparar el suelo para segunda siembra, previo a esto realizar prácticas de conservación de suelos. Trazar como siembras en contorno, acequias, barreras vivas, cultivos tempranos en maíz y uso de abonos verdes. Uso de variedades locales e intercambio de semillas, producción de semillas propias.

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Source: Central Local Technical Agroclimatic Committee- Anacafé Guatemala

BOLETÍN TÉCNICO

AGROCLIMÁTICO


ZACAPA, GUATEMALA

No. 7

Mayo - julio 2022

Apoya:



En esta edición

- Presentación 2
- Lluvia registrada entre diciembre 2021 a marzo de 2022 2
- Perspectiva climática de mayo a julio de 2022 2
- Condiciones esperadas 4
- Recomendaciones agroclimáticas 5
- Recomendaciones generales 8

PRESENTACIÓN

La Mesa Técnica Agroclimática (MTA) de Zacapa es posible gracias al trabajo conjunto y a los esfuerzos realizados por las distintas instituciones que conforman esta plataforma, enfocadas en ayudar y garantizar la seguridad alimentaria y la agricultura sostenible adaptada al cambio climático en los diversos sectores productivos del departamento.

El presente boletín incluye la perspectiva climática para el periodo mayo-julio de 2022, así como una serie de recomendaciones que esperamos sean de apoyo a técnicos, promotores agrícolas y productores del departamento.

LLUVIA REGISTRADA ENTRE DICIEMBRE 2021 - MARZO 2022

Valores de lluvia registrados en estaciones del departamento

Estación	Municipio	Precipitación (mm)				Días con lluvia (días)				% respecto al promedio	Categoría		
		Dic	Ene	Feb	Mar	Total	Dic	Ene	Feb			Mar	Total
La Unión	La Unión	-	88	85	85	258	-	13	12	9	34	179	AN
La Pasada	Estanzuela	5	4	2	1	12	2	3	1	1	7	286	AN
Pascabien	Río Hondo	6	2	-	0	8	4	1	-	0	5	281	AN

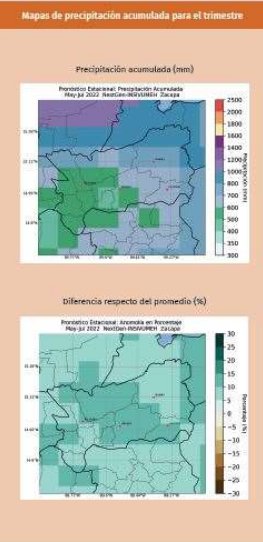
PERSPECTIVA CLIMÁTICA DE MAYO A JULIO DE 2022

La perspectiva climática para el periodo mayo, junio y julio 2022 (MJJ) fue presentada en el LXVIII Foro del Clima de América Central realizado los días 27 y 28 de mayo. Para Guatemala la perspectiva es desarrollada por INSMIVUH.

Años análogos
(condiciones similares a 2022)
2011, 2012 y 2017

Con relación a ENOS, actualmente estamos en una fase de La Niña.

Para la perspectiva mayo a julio de 2022 dicha condición persistirá como uno de los moduladores del clima en Guatemala y la temperatura del Atlántico Norte.



CONDICIONES ESPERADAS

Acumulados de lluvia esperados en el trimestre, utilizando NeXTgen

Cabeceza municipal	Precipitación mínima (mm)	Precipitación máxima (mm)
Gualán	699	766
Río Hondo	502	699
Teculután	521	597
Zacapa	469	628
Usumatán	521	597
Estanzuela	469	628
San Jorge	469	594
La Unión	854	699
Huité	533	594
Cabañas	563	609
San Diego	539	627

- En la parte oriental del departamento, se esperan lluvias por arriba del promedio, con acumulados entre 800-1000 mm.
- En las partes centro y occidental del departamento, se esperan lluvias arriba del promedio, con acumulados entre 500-600 mm.

Se recomendó ver el pronóstico estacional Recibe de precipitación - NeXTgen disponible en <https://t.me/ztacapa>.

RECOMENDACIONES AGROCLIMÁTICAS

GRANOS BÁSICOS

Maíz

Realizar monitoreo desde antes de la siembra para establecer el tipo de control de plagas que se puede implementar. Se aconseja trabajar los controles culturales, como el uso de trampas cromáticas a 30 cm del suelo y cambiarles el aceite una vez por semana.

Realizar un buen manejo de rastrojo para la retención de humedad en el suelo durante la época de sequía de la carilla, también se pueden establecer cultivos de cobertura de suelo como el ayote y frijol.

Sembrar variedades de ciclo corto y tolerantes a sequías (ICTA B7) para las áreas de ladera y mejorar la densidad de siembra para aumentar la productividad.

Implementar técnicas de siembra para mantener la humedad en la semilla, como el ahoyado profundo. Aprovechar las aboñeras que se trabajaron para incorporar materia orgánica de forma localizada en cada planta.

Frijol

Realizar monitoreo de plagas antes de la siembra para detectar focos de chinčila. Utilizar trampas culturales de cebo con afrecho y melaza para su control.

No sembrar frijol de primera en zonas secas, o sembrar en asoció para mejorar la cobertura de suelo y conservar la humedad.

Hacer aplicaciones de caldo de ceniza para el control de hongos y bacterias.



CAFÉ

Fertilización: hacer uso de abonos orgánicos (compost, estiércol, bocashi, entre otros) como alternativa al alto costo de los fertilizantes en la actualidad.

Determinar la fecha de fertilización dependiendo del fertilizante a utilizar para evitar la pérdida por lixiviados.

Manejo de plagas y enfermedades: debido a la proyección climática de este año, se espera alta incidencia de enfermedades como la roya, broca del café y ojo de gallo; por lo que se recomienda realizar un manejo adecuado de la sombra y hacer monitoreos constantes sobre el avance de estas en la parcela, también hacer aplicaciones preventivas de fungicidas y plaguicidas.

Source: Zacapa Local Technical Agroclimatic Committee – MAGA Zacapa and URL.

