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AGRICULTURAL COLOMBIAN INSTITUTE - ICA SUBGERENCE OF PLANT PROTECTION
TECHNICAL DIRECTION OF EPIDEMIOLOGY AND PHYTOSANITARY SURVEILLANCE

PRODUCTIVE AND PHYTOSANITARY CHARACTERIZATION OF THE CRISANTEMO CUT FLOWER (Chrysanthemum spp.) PRODUCTION SYSTEM IN COLOMBIA.

Bogotá D.C. Colombia
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INTRODUCTION

This document has been prepared on the basis of existing technical information, meeting the requirements established by the WTO in the Agreement on the Application of Sanitary and Phytosanitary Measures of the Uruguay Round 1994 and the International Standards for Phytosanitary Measures (ISPMs) issued by the International Plant Protection Convention (IPPC). The information provided in this document comes from different bibliographical sources of a technical - scientific nature and the opinion of experts in the field of production of cut flower of Chrysanthemum spp. in Colombia.

1 Scientific name (including family, order, genus, species, subspecies and varieties if applicable) and common name of the product to be exported

Table 1. Taxonomic classification of the species to be exported (Cut Flower).

Scientific name	Taxonomic classification	Common name
Chrysanthemum spp. (NPGS, 2012).	**Genre:** *Chrysanthemum* L. **Family:** Asteraceae Bercht. & J. Presl **Order:** Asterales Link (Tropicos, 2017)	Crisantemo (Bernal *et al.*, 2017)

2 Location and geographical description of areas or production areas

In Colombia, the production nuclei of cut flower of Chrysanthemum spp. are located mainly in the departments of Antioquia and Cundinamarca, and to a lesser extent in Bogotá D.C. and in the department of Quindío (Table 2) (Figure 1) (ICA, 2017a).

Table 2. Production zones of Chrysanthemum spp. with ICA Registration for Export

Department	Municipality
Antioquia	Carmen de Viboral
	Envigado
	Guarne
	La Ceja
	La Unión
	Marinilla
	Rionegro
	San Vicente
Cundinamarca	Chía
	Chipaque
	El Rosal
	Facatativá
	Funza
	Fusagasugá
	Madrid
	Tenjo
	Tocancipá
Quindío	Salento
Bogotá D.C.	

Source: ICA, 2017a.

Antioquia

The department of Antioquia limits to the north with the Caribbean Sea; with the department of Cordoba, has as limits the mountains of Abibe and Ayapel and with the departments of Sucre and Bolivar, and the limits are the river Cimitarra with its tributary the Tamar in great part of its route. To the east it limits with the departments of Santander and Boyacá and serves as limit of the Magdalena river in a length of 254 kilometers (PNF, 2006).

To the south, it borders the department of Caldas, with the river La Miel and its tributary the Samaná del Sur, the Arma river, the Cauca river between the mouths of the Arma and Arquía rivers, following the latter's course until its birth in the hill Los Mellizos and of this one by all the mountain range until the hill Paramillo; and the department of Risaralda, with a limit in the continuation of the mountain range that divides the hydrographic basins of the Cauca rivers, up Caramanta hill (PNF, 2006).

To the west it borders the department of Chocó, the border of the Andes in some parts and the Atrato river in others (188 km), until reaching its mouth in the Gulf of Urabá (PNF, 2006).

The geographical coordinates that cross the ends of the department are located between 5 ° 25 'north latitude, southern part of Caramanta hill, in the municipality of Andes, and 8 ° 55' north latitude (Punta Arboletes, in the municipality of same name). In the longitudinal direction, the extreme coordinates of: 77 ° 07', free port on the Atrato River, in the municipality of Turbo, and 73 ° 53', Casabe off Barrancabermeja, in the municipality of Yondó (PNF, 2006; IGAC , 2007).

The department of Antioquia is divided into nine subregions which are: Aburrá Valley, Bajo Cauca, Magdalena Medio, Northeast, North, West, East, Southwest, and Urabá (PNF, 2006). Geology is linked to the history of the formation of the western and central ranges and the plains and valleys. The geological material in the mountain ranges is very varied: sedimentary, metamorphic, metasedimentary and igneous rocks with plutonic inclusions, covered in some sectors by volcanic ash; in the valleys and plains the materials correspond to quaternary deposits of different granulometry, composition and age (IGAC, 2007).

The topography of the region of Antioquia is quite broken as it crosses the central and western ranges of the Andes that separate the valleys of the Cauca and Magdalena rivers, the first, and those of the Cauca and Atrato rivers, the second. In the center of the department is located the Metropolitan Area of the Valley of Aburrá with 1,152 Km2 (1.8% of the departmental total) and the capital Medellín with 382 Km2 (IGAC, 2007).

Cundinamarca – Bogotá D.C.

It is located in the central zone of the national territory, in the Andean Natural Region and on the eastern cordillera where the city of Bogota is located, capital of the department and the country. The west of the department is formed by the depression that leads to the valley of the Magdalena River and the east by which forms the Piedmont llanero (PNF, 2006).

Geographically it is framed by the coordinates 3 ° 42 'and 5 ° 51' north latitude, and 73 ° 03 'and 74 ° 54' west longitude of Greenwich. In the north, it borders on the department of Boyacá, on the south with the departments of Meta, Huila and Tolima, on the east with the departments of Boyacá and Meta and on the west with the departments of Caldas and Tolima (PNF, 2006).

Taking into account the previous definition of limits, the department of Cundinamarca has an area of 24,210 km2 including water bodies (rivers, lakes and lagoons), an area that represents approximately 2.1% of the country's area (PNF, 2006) .

In the greater part of the region belonging to the jurisdiction of the department of Cundinamarca, both the sedimentary rocks of marine environment predominate, as well as the sedimentary rocks of continental environment. Towards the southeastern sector of the department and rising to a lesser extent, are metamorphic and metasedimentary rocks of the Paleozoic. Outcrops in small nuclei are sedimentary rocks of the Jurassic, which together with the rocks of the Paleozoic form the basement on which lie powerful sequences of sedimentary rocks folded and fractured Cretaceous and Tertiary that in many places are buried by extensive deposits of the Quaternary of different origin, that make up the current geological expression (IGAC, 2007). In the department of Cundinamarca are the following landscapes: mountain, lomerío, piedemonte, plain and valley (IGAC, 2007).

Quindío

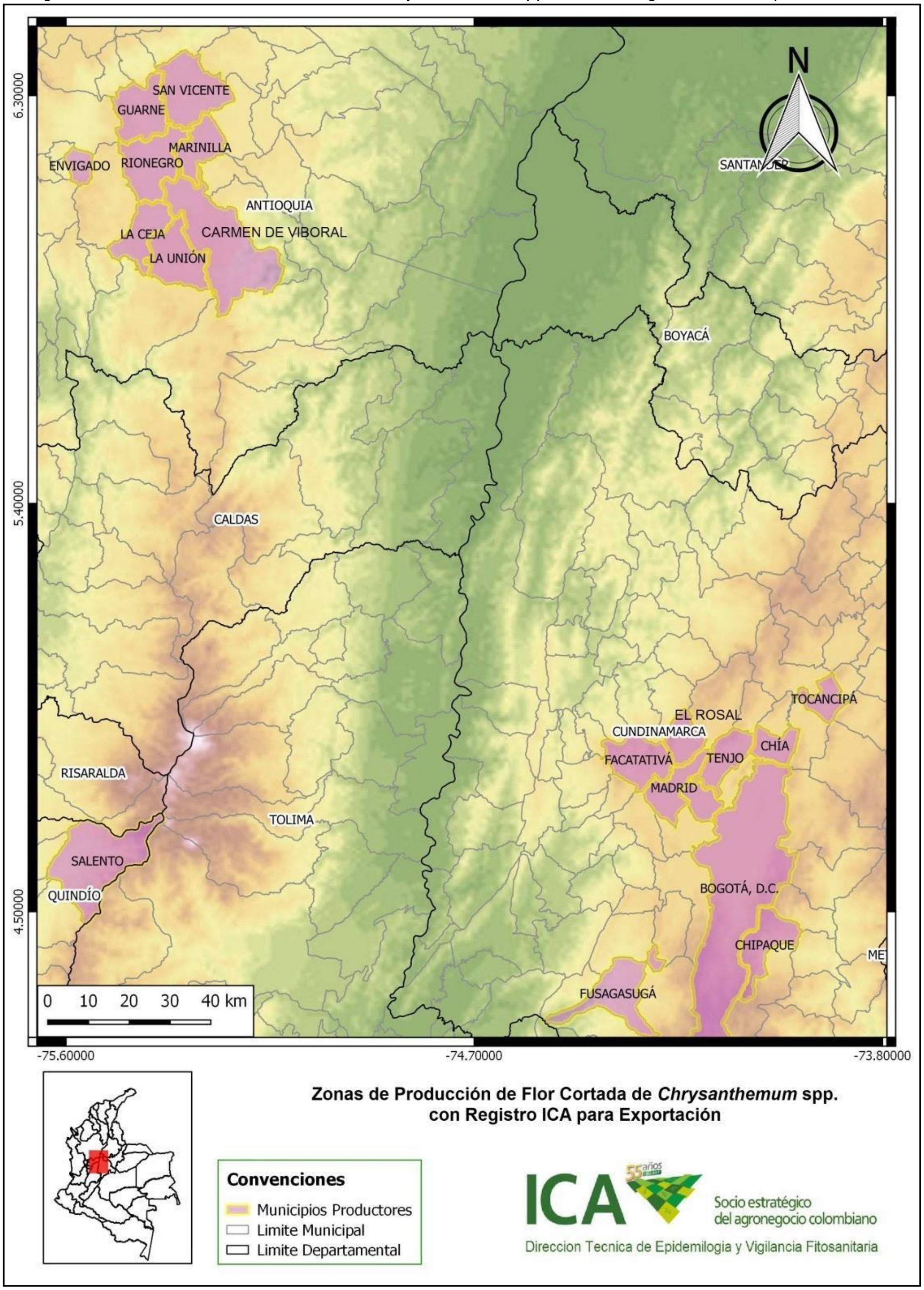
The department of Quindío is located in the center-west region of the country, between 4 ° 04 'and 4 ° 44' N and 75 ° 24 'and 75 ° 52' W, in the center of the triangle of gold formed by the three most important cities of the country Bogota - Medellín - Cali. The surface area of the department is 1,845 km², which represent only 0.2% of the total area of the country (PNF, 2006).

Its boundaries are: to the north with the departments of Valle del Cauca and Risaralda, to the east with the department of Tolima, to the south with the departments of Tolima and Valle del Cauca, and to the west with the department of Valle del Cauca. (Governorate of Quindío, 2013).

It presents two types of reliefs, one mountainous that is located in the east; and the other, wavy, located in the west. The mountainous corresponds to the western side of the central mountain range and extends in a south - north direction, with abrupt slopes; mostly presents metamorphic rocks. The corrugated corresponds to the area covered by flows of volcanic muds transported by the rivers, which represents a soft modeling of low hills. In the westernmost region of this morphology are the valleys of the rivers Barragán, to the south, of recent alluviums; and the one of La Vieja, to the north, of sedimentary rocks. These rivers receive all the currents that come from the mountain range. The rivers stand out: San Juan, Rojo, Verde, Espejo and Quindío, the longest. (Governorate of Quindío, 2013).

3 Map of the country indicating the location of the production zones.

Figure 1. Production areas of cut flower of Chrysanthemum spp. with ICA registration for export.



Source: ICA, 2017a

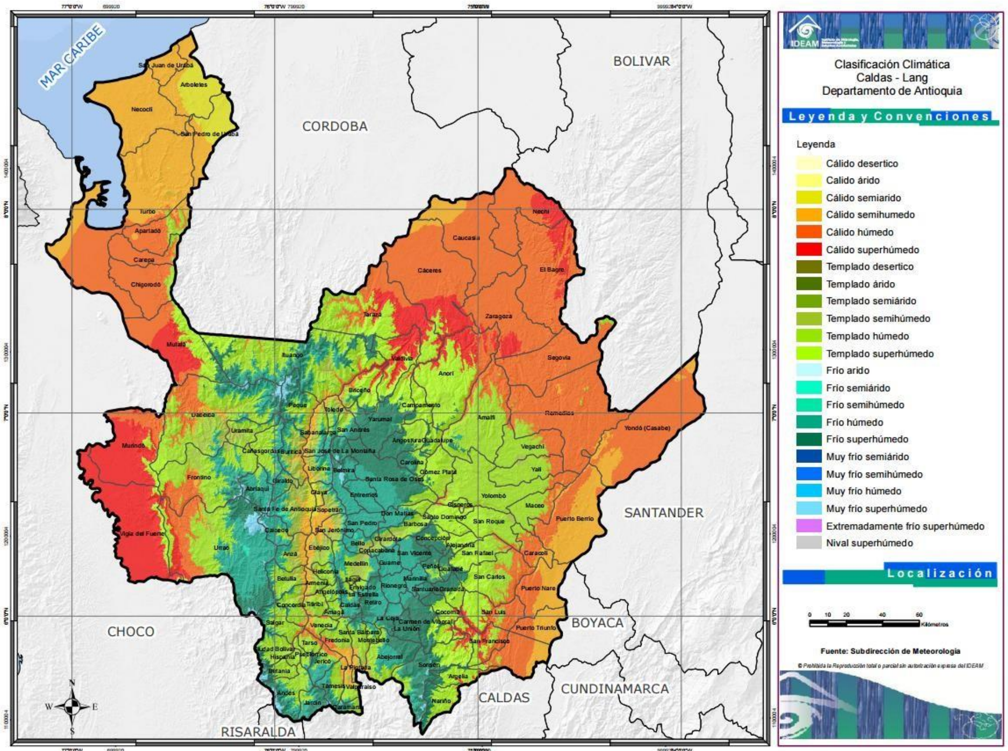
4 Climatic conditions of production areas.

ANTIOQUIA

Climate Classification

Warm humid and semi-humid climates are located in the western (Urabá and limits with Chocó), eastern (Caucasia, Magdalena medio) and central (Cauca river valley) strips. Temperate and cold climates are distributed in the slopes of the central and western ranges and occupy the center of the department (IDEAM, 2015).

Figure 2. Weather department of Antioquia.



Source: IDEAM, 2015

Precipitation

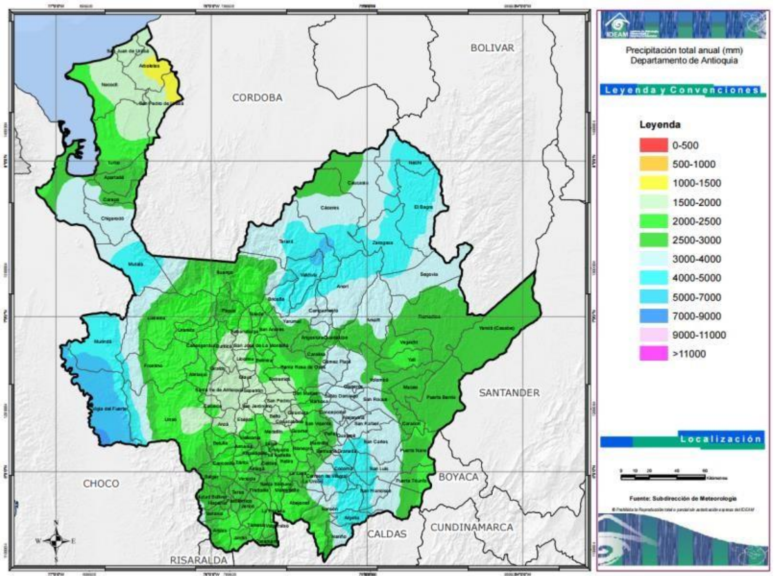
Precipitation in Antioquia ranges between 1,500 and 4,000 mm annually. The zones of smaller precipitations are located in the geographical valley of the Cauca river, towards the west of the department. The highest rains are recorded in the Urabá region at the border with the department of Chocó, at the extreme southwest, near Carmen de Vivoral, and at Bajo Cauca Antioquia (IDEAM, 2015).

The distribution of rainfall during the year is bimodal in most of the department. There are two dry seasons, the first one, well-marked, at the beginning of the year and the second, of less intensity, in the middle of the same, and two rainy seasons, April-May and October-November. To the north of the department, in the lower Cauca area, the regime is mono-modal with a single dry season from December to March and a rainy season the rest of the year (IDEAM, 2015).

The number of rainy days per year varies between 100 and 150 in sectors of northern Urabá, boundaries with the east of Cordoba and the middle Magdalena valley. To the southeast of the department, in the region of greater rains, the

number of rainy days during the year is close to 300. The rest of the department records about 250 days with rainfall per year (IDEAM, 2015).

Figure 3. Annual average precipitation department of Antioquia.

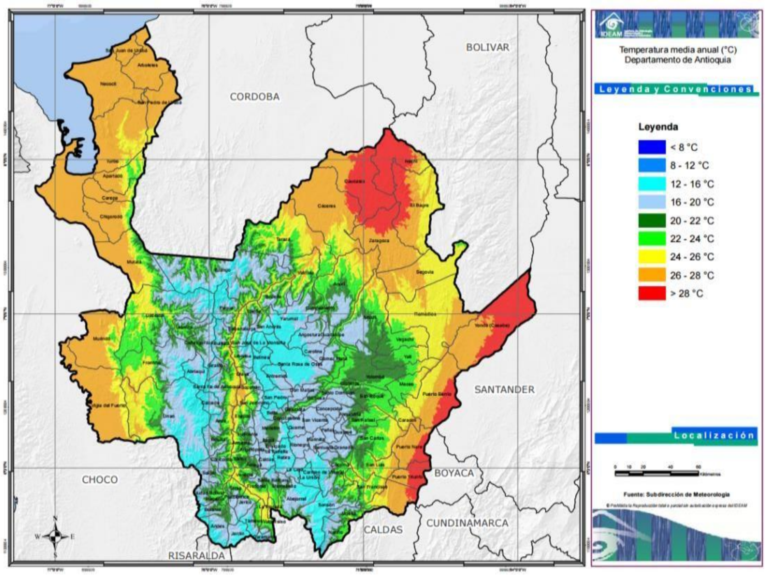


Source: IDEAM, 2015

Temperature

Due to its rugged topography, the department presents most of the thermal floors defined by the Caldas classification. On the banks of the Magdalena, as well as in the Caucasia sector, temperatures exceed 28 ° C, constituting itself in the hottest sectors of the department. Temperatures range between 26 and 28 ° C in Urabá Antioquia and in the Cauca River Valley. In the rest of the Antioquia mountain, temperatures are closely dependent on elevation, generating cold and temperate thermal floors (IDEAM, 2015).

Figure 4. Annual average temperature department of Antioquia



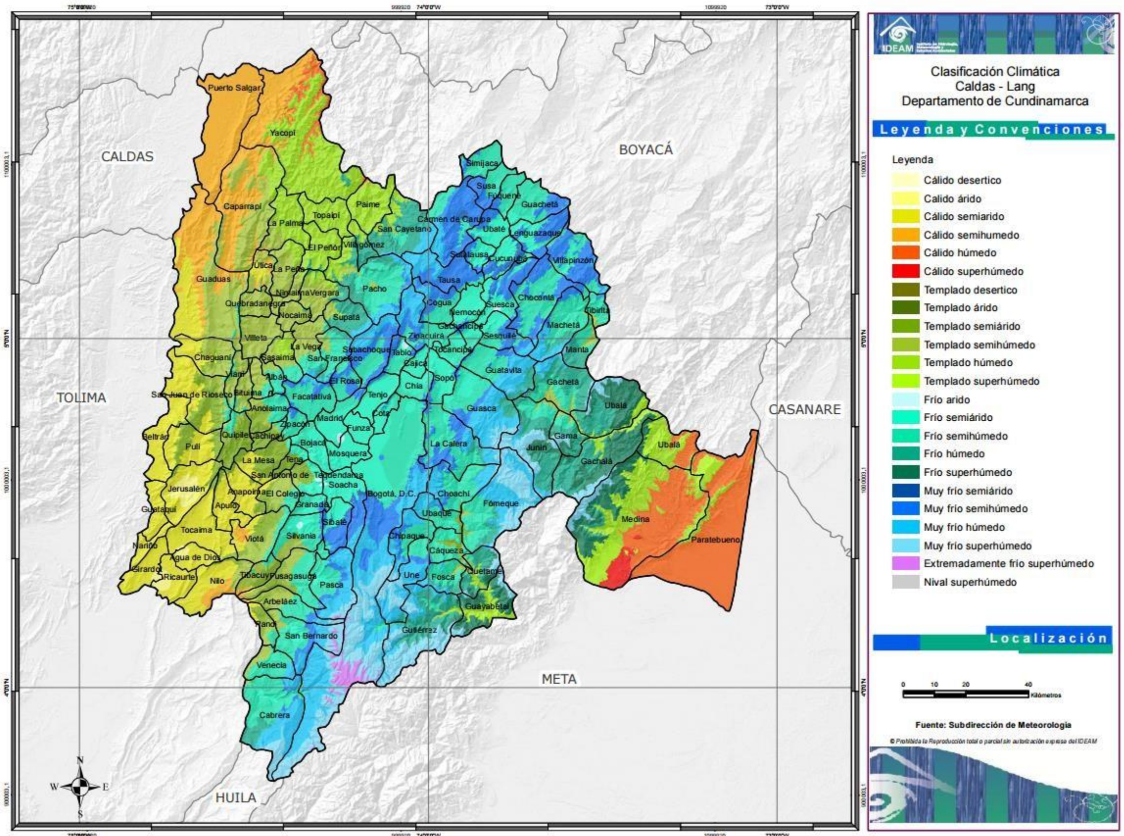
Source: IDEAM, 2015

CUNDINAMARCA - BOGOTÁ D.C.

Climate Classification

Most of the central zone, corresponding to the Sabana of Bogota, is of semi-arid cold climate. The sites located at higher elevations belong to very humid and semi-humid climates. To the west, the climate is warm arid to the south and warm wet to the north. At the eastern end, the climate is hot humid (IDEAM, 2015).

Figure 5. Climate department of Cundinamarca - Bogotá D.C.



Source: IDEAM, 2015

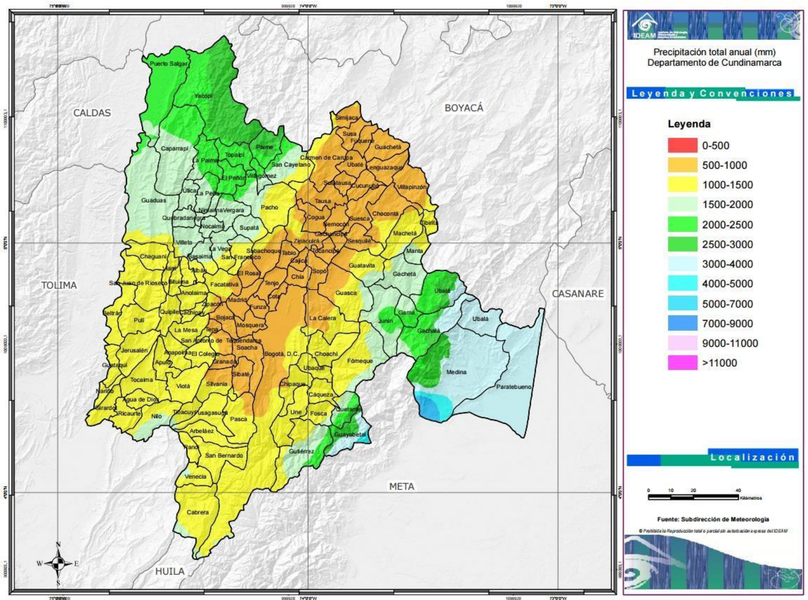
Precipitation

The department has a very varied pattern in terms of rainfall volumes. The lowest rainfall nucleus occupies the central strip, corresponding to the Savannah of Bogotá, with annual quantities smaller than 1,000 mm. The rains increase towards the east and west towards the slopes of the eastern mountain range. In the eastern slope the rains reach the highest values of the department with values close to 4,000 mm in the municipalities of Ubalá, Medina and Paratebueno. Towards the western slope are recorded around 3,000 mm in Yacopí and Paime (IDEAM, 2015).

The rainfall regime in the central belt is bimodal type with two dry seasons in December-March and June-August. To the east, in the municipalities located on the slope of the Orinoco, the regime is monomodal type with a dry season from December to March and rain maximums in the months of June and July. A slight decrease is detected at the end of August (IDEAM, 2015).

The number of days with rain varies between 100 and 150 on the Savannah of Bogota. To the east one arrives to more than 200 days in the slopes of the mountain range. To the west, values fall to less than 100 days in places like Nariño and Beltrán (IDEAM, 2015).

Figure 6. Annual average precipitation department of Cundinamarca - Bogotá D.C.

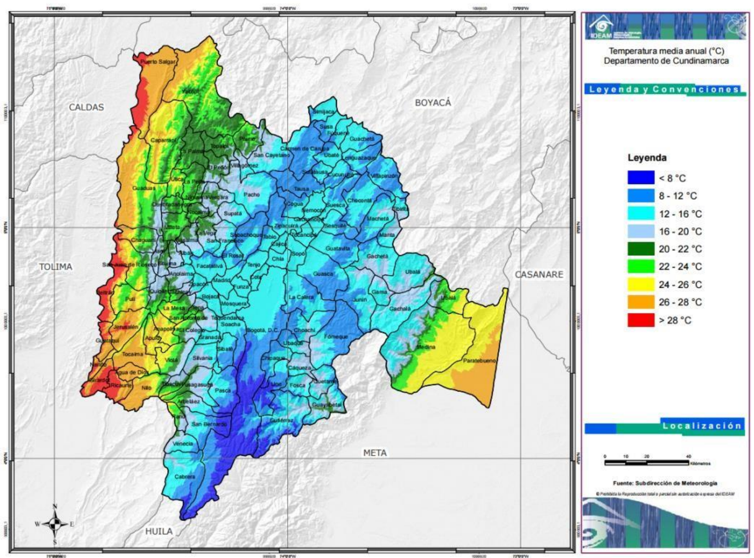


Source: IDEAM, 2015.

Temperature

Most of the department belongs to cold and very cold thermal floors. To the east temperatures increase to about 26 ° C in Paratebueno. To the west, average temperatures of around 28 ° C are recorded in sectors located on the banks of the Magdalena (IDEAM, 2015).

Figure 7. Annual average temperature department of Cundinamarca - Bogotá D.C.

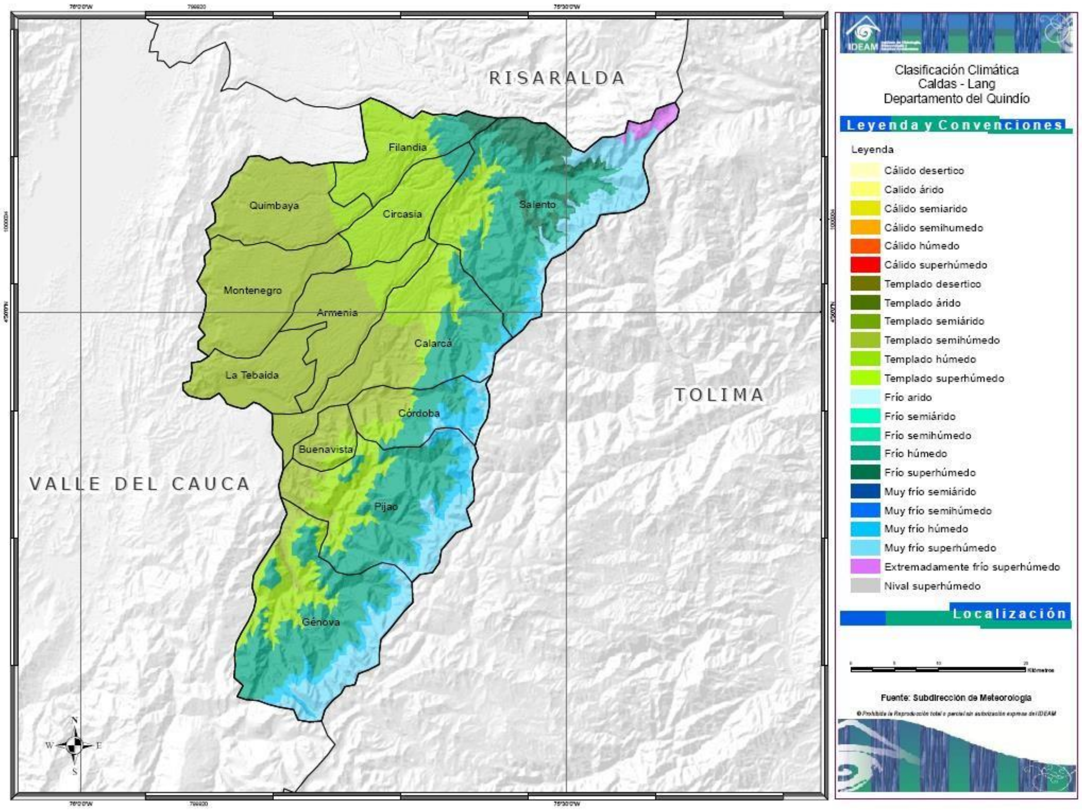


Source: IDEAM, 2015

QUINDÍO

Weather conditions
The semi-humid and humid temperate climates predominate to the west and center of the department. Along the eastern fringe there are cold and very cold climates of wet and superhumid type (IDEAM, 2015).

Figure 8. Climatic classification of the department of Quindío



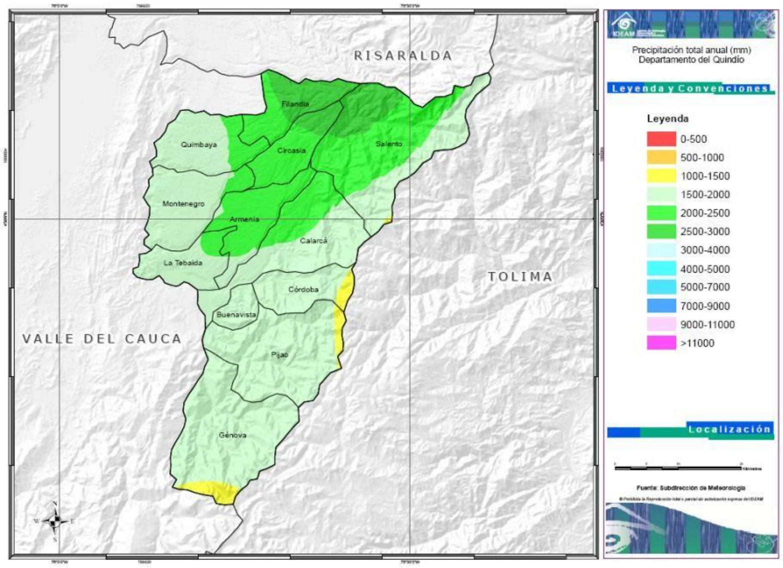
Source: IDEAM, 2015.

Precipitation
Most of the department has annual precipitation volumes in the range of 1,500 to 2,500 mm, on average. The nuclei of greater precipitation are observed towards the limits with Risaralda, in the municipalities of Filandia and Salento. At the center of the department, in Armenia and Calarcá, rainfall decreases to 2,000 mm, and in the rest of the territory, moderate amounts predominate, from 1,500 to 2,000 mm annually. In Tolima limits, annual totals are slightly lower, on average (IDEAM, 2015).

The predominant rainfall regime in most of the territory is the one corresponding to the upper basin of the Magdalena and Cauca rivers. It is bimodal type with two dry seasons, the first, very marked, in the months of June, July and August and the second, less noticeable, in January and February. The months of the highest rains are April and May in the first semester and October and November, in the second (IDEAM, 2015).

The number of rainy days has two well-defined zones: the central and eastern fringe in which it rains an average of 150 to 200 days a year and the western fringe, specifically in the municipalities of Quimbaya, Montenegro and La Tebaida, in which are recorded between 100 and 150 rainy days per year, on average. A nucleus isolated with higher frequencies, can present to the extreme north, in limits with Risaralda (IDEAM, 2015).

Figure 9. Annual total precipitation (mm) in the department of Quindío.

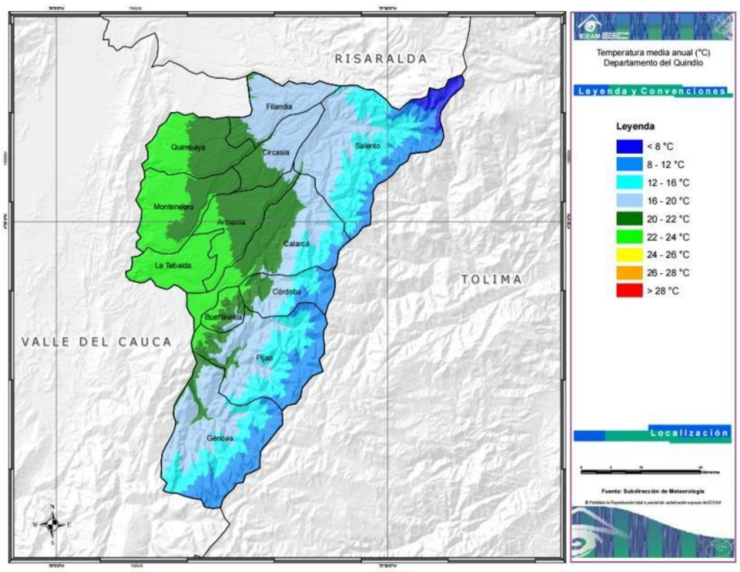


Source: IDEAM, 2015.

Temperature

Being a mountainous department, the temperature regime is directly dependent on the elevation. The lowest municipalities such as Quimbaya, Montenegro and La Tebaida have average annual temperatures between 22 and 24 ° C. As the central cordillera ascends, the temperature decreases until reaching mean values lower than 8 ° C, towards the upper part of the municipalities located along the border with Tolima (IDEAM, 2015).

Figure 10. Average temperature of the department of Quindío department.



Source: IDEAM, 2015.

5 List of pests associated with the part of the plant to be exported.

Table 3. Pest associated with the production systems of *Chrysantemum* spp.

Scientific name of the pest	Affected party	Reference (CO)
Mites		
Tetranychidae		
Tetranychus urticae Koch	Leaf (Posada, 1989, Urueta, 1975).	Posada, 1989; Urueta, 1975.
Insects		
Diptera: Agromyzidae		
Liriomyza huidobrensis (Blanchard)	Leaf (Luque & González, 1995; Posada, 1989).	Luque & González, 1995; Posada, 1989.
Liriomyza trifolii (Burgess)	Leaf (Mora & Mosquera, 1984; Posada, 1989).	Mora & Mosquera, 1984; Posada, 1989.
Hemiptera: Aphididae		
Myzus persicae (Sulzer)	Flower (Monguí *et al.,* 1986), Leaf (Figueroa, 1977; Monguí *et al.,* 1986; Posada, 1989).	Figueroa, 1977; Monguí *et al.,*1986 Posada, 1989
Thysanoptera: Thripidae		
Frankliniella occidentalis (Pergande)	Flor (Cárdenas & Corredor, 1989).	Cárdenas & Corredor, 1989
Fungus		
Ascomycetes, Helotiales		
Botryotinia fuckeliana (of Bary) Whetzel **Synonymy:** *Botrytis cinerea* Pers.: Fr.	Flower, Leaf, Stem (Henao *et al.,* 1985).	Buriticá, 1999 Henao *et al.,* 1985
Sclerotinia sclerotiorum (Lib.) of Bary	Stem (Delgado & Arbeláez, 1990; Valencia & Arbeláez, 1999).	Delgado & Arbeláez, 1990 Valencia & Arbeláez, 1999
Urediniomycetes, Uredinales		
Puccinia horiana Henn.	Leaf (ASOCOLFLORES, 1989)	ASOCOLFLORES, 1989, Pardo, 2006
Virus		
Bunyaviridae		
Tomato spotted wilt virus	N/A	Angarita, 1995

5.1 MITES

5.1.1 Tetranychus urticae Koch

The genus Tetranychus is recognized mainly because its individuals have striped empodium, the wide separation of the double mushrooms and the presence of a single pair of para-anal setae (Pritchard & Baker, 1955 quoted by Urueta, 1975).

T. urticae is characterized by having the dorsal spur of the empodium small or absent; the proximal pair of double setae of tarsus 1 is distal to the four tactile setae of the base of said segment; the female has longitudinal grooves between the third pair of hysterosomal dorsocentral setae and also between the inner sacrum setae, forming a diamond-like figure in the area between these setae (Pritchard & Baker, 1955 quoted by Urueta, 1975).

This mite passes through egg state, egg larva, nymph and adult. Their life cycle can be completed in approximately 14 days, but egg-to-adult development time of T. urticae decreases with increasing temperature (Cantor & Rodríguez, 2011).

The egg has a spherical shape and varies from transparent and colorless to opaque and straw yellow in color. The larva has six legs, is colorless at first, and then pale green or yellow. The nymph is similar to the adult except for the size, has eight legs and is pale green to green-brown; can develop large black spots on each side. Finally, the adult is eight-legged and its color varies between light green, greenish amber and yellow (Baker et al., 1996).

The females begin to lay eggs approximately two days after reaching their adult status reaching an average of 100 eggs for two weeks at 25 ° C, with a gender ratio of three females per male (Cantor & Rodríguez, 2011).

The damage is produced by individuals scraping the leaf, to suck the sap and chlorophyll, causing the destruction of the stomata and parenchyma. The females construct cobwebs that serve as protection for the postures, and are also used as a means of dispersion (Andrade et al., 1982).

Individuals may prevail in soil or in weeds that serve as alternate hosts (Baker et al., 1996). Its dispersion occurs actively walking or passively through the wind, tools used in cultivation, and personal clothing (Cantor & Rodríguez, 2011).

5.2 INSECTS

5.2.1 Liriomyza huidobrensis (Blanchard)

The larvae are milky white to yellowish white and measure at maximum 3.5 mm; the pupae may be pale yellow to black and measure at most 2.2 mm. Adults have a bright yellow thoracic shield (Malais & Ravensberg, 2006). Its wings measure between 1.6 and 2.1 mm. It usually deposits the eggs near the base of the petioles of the leaves; the larvae undermine the underside of the leaves, which is why mines are not easily seen from above. The pupae have posterior spiracles of 6 to 9 pores organized as an arch (Gill et al., 2001).

5.2.2 Liriomyza trifolii (Burgess)

This insect is light colored, the upper part of the chest is gray and the sculete is bright yellow. It has a yellow area behind each eye where two thick bristles come out; its legs have yellow and warm thighs and females and brown tarsi. Under the greenhouse or in tropical and subtropical zones it reproduces all the year. The eggs are oval, translucent and smooth. It presents three instars larvales on leaves, each one lasts between 7 and 8 days. When the mine is excavated the larvae that are located inside are yellow or orange and have three respiratory pores. The pupa develops within the leaf and has a cycle of 7 to 11 days. Adults live between 3 and 4 weeks (Gill et al., 2001). The average life of the males is much smaller than that of females. The female performs two types of bites usually in the leaf bundle, a test and feed; the other, oviposition. In the first case the female selects the site, inserts the ovipositor into the epidermis of the leaf, removes it and tests the exudates through the perforation. It is fed and then oviposited (Mora & Mosquera, 1984).

5.2.3 Myzus persicae (Sulzer)

In open field conditions, many species of aphids have a primary host on which they reproduce sexually and asexually and a secondary one giving rise to a viviparous and parthenogenetic development. Its migration occurs through its winged forms from one plant to another. In many species of aphids males are produced when the temperature drops, resulting in sexual reproduction. Paired females lay eggs with better conditions to survive. Aphids migrate to woody plants to lay eggs when the weather is unfavorable (Gill et al., 2001).

5.2.4 Frankliniella occidentalis (Pergande)

The life cycle comprises an egg state, two stages of active larvae, two stages of pupa, relatively quiescent, and adulthood (Reitz, 2009).

The larvae are yellow to orange-yellow. These insects have 8 antennal segments. The population of F. occidentalis is composed of males and females, the latter being larger and darker than the males. The abdomen of the males has two spots of orange color, that of the females narrows in the form of a tip to one end leaving the ovipositor visible. Population development depends on temperature, relative humidity and host plant species. The fastest development occurs at 30 ° C; stops above 35 ° C and below 10 ° C. Reproduction is sexual or asexual. The offspring of the unfertilized females is male, that of the females is male and female in a ratio of 2: 1, respectively (Malais & Ravensberg, 2006).

As for the adult, its coloration varies depending on the temperature in which it is; when temperatures are high develop species with a clear coloration, while in the cold dark species occur; therefore, in the Bogotá savannah adults are dark-colored (Muñoz et al., 2008).

The individuals cause damage to plant folioles and flowers, causing distortions and presence of discontinuous colorless necroses that are caused by larvae and adults that by puncturing and suctioning the cellular contents of the tissues with their oral apparatus produce this symptomatology (Muñoz et al. al., 2008). When they feed on developing tissues, the cells fail to expand so that mature leaves and flowers are distorted. The scars left by the ovoposition and feeding reduce the aesthetic quality and therefore the commercial value of the product (Baker et al., 1996).

5.3 FUNGUS

5.3.1 Botryotinia fuckeliana (de Bary) Whetzel Synonymy: ***Botrytis cinerea*** **Pers. : Fr.**

This fungus acts primarily as a saprophyte and necrophiliac and initially establishes in decomposed or weakened plant parts and subsequently extends to the rest of the plant's healthy tissue. It can be a secondary invader attacking plants already infected by another pathogen. At the same time, it is considered a primary pathogen because it can penetrate directly into its hosts through the cuticle through the production of enzymes that degrade its components (Gómez, 2013).

There are four major types of dispersal propagules in the epidemiology of this fungus: ascospores, conidia, mycelium and sclerotia. It is considered that microconidia are produced only in sexual function and chlamydospores and oidia have unknown and probably unimportant functions. Conidia are released by a hygroscopic mechanism and are therefore more abundant in the air when rapid changes of relative humidity occur during the day and are easily spread by air. Sclerotia can also produce microconidia (CABI, 2016).

The optimal temperature for spore formation is between 15 and 20 ° C for mycelial growth. At temperatures below 15 ° C, the rate of sporulation drops considerably and at 10 ° C is only 10% of sporulation at 15 ° C or even lower. Approximate optimum relative humidity is 90% for spore production; most spores occur at night, provided the temperature is high enough (CABI, 2016).

The mycelium of B. cinerea is constituted by a set of hyphae or filaments, cylindrical, which multiply by cytoplasmic division, being common that it has a nuclear division without cytoplasmic division. This results in cenocytic hyphae with a high and variable number of nuclei. It is characterized by its branched conidiophores and is regularly found on the surface of infected tissues (Gómez, 2013). Vegetable remains containing mycelium as dispersal propagules that are washed away by wind and rain are a large inoculum (CABI, 2016).

***5.3.2 Sclerotinia sclerotiorum* (Lib.) de Bary**

Diseases caused by Sclerotinia are known, among other names, as cottony rot or white mold. The main symptom on an infected plant is the appearance of a hairy and white mycelium in which shortly after starting the infectious process, are formed compact structures of resistance or sclerotia. The sclerotia are white at first and then black, these harden at the level of their surfaces. Their diameter can be of 2 to 10 mm or more, although in general, they are more flattened and long than spherical. When the sclerotia germinate, they produce from one to several thin stems that end in apotecio that has a diameter of 5 to 15 mm and is shaped like cup or disc, and in which the ascas and the ascospores are formed. These apotheciaes release numerous ascospores into the air after 2 to 3 weeks. Ascospores are disseminated and, if deposited on senescent plant organs, germinate and produce infection (Agrios, 1988).

In the early stages of development of the stem lesion, the leaves show very few signs of the fungus attack, which is why infected plants pass easily unnoticed until the fungus develops completely on the stem and rots it. Therefore, the foliage located above the lesion withers and dies quickly. In some cases, the infection starts on a leaf and then proceeds to the stem through the leaf. The sclerotia of the fungus can be formed internally in the marrow of the stem, without showing signs that they are there, or they can form outside the stem (Agrios, 1988).

S. sclerotiorum is particularly aggressive when the climate is cool and rainy; in these cases, a considerable amount of spores are transported through the air towards susceptible plants (Gill et al., 2001). Because the disease thrives when high soil moisture and high relative humidity occur, susceptible crops should be planted only in well drained soils and densities that allow aeration of the plants. In case the disease becomes severe, the infected plants should be ripped and burned to prevent the fungus from forming sclerotia. Because sclerotia remain viable in the soil for approximately 3 years, infected fields should be planted with non-susceptible crops (Agrios, 1988).

5.3.3 Puccinia horiana Henn.

The fungus P. horiana is an obligate parasite, does not present an alternate host and spreads in living plant material. Their pollution structures are transported by wind, water or adhered to surfaces. It presents teliospores, which are bicellular structures that resist dry conditions and low temperature, compared to the basidiospores and remain viable for up to 8 weeks in adverse conditions. Basidiospores or sporidia are very sensitive structures to desiccation, need relative humidity higher than 90% and a film of water on the surface of the leaf in order to germinate. Germination of teliospores occurs when relative humidities of 96% or more are present and temperatures from 4 to 23 ° C, with 17 ° C being the optimum. Next, there is the formation of promyelium and sporidia that are released 2 to 6 hours after teliospore germination. Sporidias germinate immediately when a film of water is present on the chrysanthemum leaves. Leaf tissue penetration occurs within two hours of germination (ICA - ASOCOLFLORES, 2005).

The symptoms appear in the bundle of the leaf, where they appear spots of greenish yellow color, of circular form, with well-defined borders, presenting a sinking. On the underside, white-yellowish creamy pustules protrude, which release the sporidia and turn light brown. Symptoms appear 9 to 10 days after infection. Seven days later germinative spores are formed, starting the cycle again (ICA - ASOCOLFLORES, 2005).

5.4 VIRUS

5.4.1 Tomato spotted wilt virus

The size of icosahedral particles varies between 70 and 85 nm in diameter. The most common symptoms in chrysanthemums in the Savannah of Bogotá are evidenced by the presence of clear necrotic longitudinal lines in the stems, necrotic spots that form depressions at the point of insertion of the leaves. In some cases necrotic lines may appear in the leaf's main veins and in advanced cases necrotic spots towards the edges of the leaves. In affected plants close to flowering, a reduction of height, thin stems and chlorotic terminal leaves is observed. It can be transmitted biologically by thrips or cuttings from contaminated mother plants (Angarita, 1995).

6 Production methods including description of propagation, crop and pest management.

The planning of the production process is done 42 weeks before the cut-off time, agreeing with the customers abroad the quantities and varieties of the product demanded (C.I. Flores de la Vega, 2017, C.I. Florco, 2017, Flores Esmeralda, 2017)

Infrastructure

The productive cycle takes place in greenhouses to avoid the direct impact of rain on the plants, control soil moisture and protect the infrastructure required to provide the necessary light hours during the different stages of the plant. Similarly, within greenhouses with plants for cut flower production, a drip irrigation system is used to reduce relative humidity and avoid optimal conditions for the development of pathogens (Arango, 1999, CI Flores de la Vega , 2017, CI Florco, 2017, Flores Esmeralda, 2017).

Propagation material

In Colombia, any natural or legal person engaged in the production, marketing and / or importation of seeds for planting in the country, obtained through conventional and non-conventional genetic breeding methods must be registered with the ICA and meet the requirements established in the current rules on biosafety, guaranteeing the maintenance of the authorized cultivars in their register, fulfilling the minimum quality requirements, varietal purity and also, register the commercialization of the material. Similarly, importers of asexual and sexual propagation material of ornamental species are obliged to respond to the phytosanitary status of the propagating material, to provide on each import the list of producers who will receive the propagating material; Additionally; the producers, in whose places of production the material is to be planted, must have a certificate of registration of the place of production and contract of technical assistance with a professional who has a plant health record granted by the ICA. (ICA, 2008, ICA, 2015a).

The propagation method used is by terminal cuttings. The origin of these begins in hybrid companies registered with the ICA that produce in vitro material, which is taken to chrysanthemum production nuclei where it is hardened to give rise to grandmother plants, from which we obtain mother plants that produce cuttings for 12 weeks after sowing; after this period they are renewed (C.I. Flores de la Vega, 2017; C.I. Florco, 2017; Flores Esmeralda, 2017).

These generations of plants are produced under greenhouses totally confined with anti-thrips meshes to prevent the entrance of insects, in addition there are footbaths to avoid the entrance of pathogens and an artificial lighting system to guarantee the necessary light hours so that the plants do not reproductive buds. To the propagation zone, only authorized personnel are allowed access and people are not admitted if they have had to visit the sectors of production of cut flower (CI Flores de la Vega, 2017, CI Florco, 2017, Flowers Emerald, 2017).

For harvesting of cuttings, use a heat-sterilized metal shovel and disinfected with a solution of 3% sodium hypochlorite or 70% industrial alcohol. The area for planting of mother plants is approximately 10% of the area projected for production of cut flower, obtaining approximately ten cuttings per mother plant and two more that will serve to replace affected plants (CI Flores de la Vega, 2017 CI Florco , 2017, Flores Esmeralda, 2017).

Table 4. Propagation and Production Process of *Chrysantemum* spp.

Operation	Description
Management of propagation material	The production of cuttings begins 12 days after the transplantation of the mother plant when the pinch work is done to eliminate the apical dominance and promote the production of lateral buds, leaving in the plant between 5 and 7 leaves. This activity is carried out manually, using surgical gloves, which are daily renewed by staff to avoid contamination with pests from other plant blocks. The cuttings are harvested in three groups making a cut every four weeks: in the first cut two cuttings are obtained, this cut promotes the production of new lateral buds in such a way that in the second cut four cuttings are obtained and finally, in the last cut the last 6 are obtained.

Operation	Description
	The harvested cuttings are taken to a cold room with temperatures between 2 and 4 ° C for three weeks and rooting is done, with the help of hormones, directly into raised beds or in trays of 128 wells with a substrate composed of wood sawdust of conifers plus soil or sand whose proportions are between 50-50 and 80-20. If the seedlings are produced directly on raised beds, the transplant is given on a bare root and the baskets with the plant material are immersed in a solution with pesticides to contribute to the health of the cuttings; if the production is in trays, they are not submerged to prevent the pylon from disassembling, but are sprinkled with the same purpose.
Sowing	The preparation of the soil begins with the disinfection of the same, for this work different techniques are presented, such as the passage of the same through boilers, and the use of chemical and biological synthesis pesticides under the supervision of an agronomist. Once the substrate is disinfected, a pre-emergent herbicide is applied and the soil is then prepared and bedded. On the beds there is a guidewire (Figure 11) that guarantees an adequate seeding density of the seedlings, either on bare root or with the pylons. The beds are divided by placing a rod per 20 mesh of the guide mesh to facilitate its handling during plant growth and to establish a good spatial arrangement in the work of direct monitoring of pests and records management. Figure 11. Guide mesh during sowing.  Source: ICA, 2017b.

Operation	Description
Management during vegetative growth	In this stage, the work of tutoring is done, raising guide mesh to 2/3 of the height of the plant to maintain the stem straight and ensure a flower of good quality. Although during the entire productive cycle a constant weeding program is managed, at this stage the elimination of herbs with flower is prioritized to avoid the production of seeds that facilitate their propagation, and those that surpass the height of the chrysanthemum as they compete with the species of interest for light; later, this work is reviewed to eliminate the remaining weeds preventing the plagues of the chrysanthemum find alternative hosts. Likewise, care is taken to ensure that there are no host species on the outer edges of the greenhouses.
Disbudding	Pruning is done to remove the lateral or apical buds of the plants, depending on the cultivated variety, to give the desired architecture to the cut flower according to the preferences of the client, this work is always done after eradicating diseased plants to prevent the spread of pathogens and not invest time in plants that will be eliminated.

Sourse: Arango, 1999; C.I. Flores de la Vega, 2017; C.I. Florco, 2017; Flores Esmeralda, 2017.

Cultural control

All vegetable residues resulting from weeding, pruning or removal of post-harvest plants and sticks are carried out quickly, to a composting process in an isolated area, specially designed for this purpose with its proper handling. Those residues that show phytosanitary problems are transported in bags, to an isolated area where the plant material is buried to prevent the spread of pests and diseases (C.I. Flores de la Vega, 2017. C.I. Florco, 2017; Flores Esmeralda, 2017).

Physical Control

At the entrance to the production sites are disinfection zones of vehicles and inside the greenhouses are located pediluvios to avoid the entry of pathogens through the footwear. The greenhouses manage external mesh curtains to restrict the entry of arthropods (C.I. Flores de la Vega, 2017; C.I. Florco, 2017; Flores Esmeralda, 2017).

Mechanical control

As part of the mechanical control is made use of insect vacuuming machines, mainly miners, this opera an 8 inch flexible hose with a mesh bag at the entrance that obstructs the passage of insects into the artifact so that an operator, Manual, select the beneficial insects and then release them (Figure 12). Jama passes are also made on the beds with the same objective.

Figure 12. Insect Aspiration.

Source: ICA, 2017b.

Ethological control

Inside the greenhouses, there are colored plastic bands with oil: blue for the capture of Frankliniella occidentalis and yellow for miners (Figure 13) (CI Flores de la Vega, 2017, CI Florco, 2017, Flores Esmeralda, 2017) .

Figure 13.
Figure 14. Color bands for insect control.

Source: ICA, 2017b.

Chemical and biological control

This type of control is performed as part of the MIP, under the technical assistance of an agronomist, rotating the mechanism of action of the molecules of the active ingredients, according to calculations based on the results of the monitoring of the different pests (CI Flowers of the Vega, 2017, CI Florco, 2017, Flores Emerald, 2017).

The doses, application period and periods of re-entry to the treated areas are done according to the indications of the label of each pesticide following the guidelines of the agronomist responsible for the plant health of each place of production (CI Flores de la Vega, 2017, CI Florco, 2017, Flores Esmeralda, 2017).

Monitoring

- Direct monitoring

Direct monitoring at the production site is carried out on a weekly basis at least 10% of the total crop. In each bed are inspected at least three sites, chosen with the help of the spatial distribution drawn from the sowing with the guide mesh, in case the bed is very long is monitored every 10 meters, in each site are inspected at least three plants below upwards to make a revision of all strata of the plant and its structures, in order to find in a timely manner the presence of possible damages or plagues. Each week 10% of the sampled area is broken (staggered) to the total area of the production site. In case of detecting any pest, the entire bed is monitored and the affected bed is identified with colored ribbons to perform the focused management according to the guidelines of the technical assistant. The flowers harvested from this bed are also identified to inspect the branches in the post-harvest area, verifying that the management has been successful (C.I. Flores de la Vega, 2017; C.I. Florco, 2017; Flores Esmeralda, 2017).

The monitoring for white rust is done weekly and according to the phenological stage of the crop the minimum time established in Resolution 20008 of 2016 is reversed "by means of which the Plan of Contingency of the White Rust of Chrysanthemum (Puccinia horiana Hen) in Colombia "(Table 5)

Table 5. Time established for the monitoring of white rust in beds of 36 m2 according to the stage of cultivation.

Crop stage	Time
Nuclei, grandmothers and mother plants	15 minutes
Rooting benches	10 minutes
Plants from the sow to the pre-cut	10 minutes
Pre-Cut Plants	30 minutes
Cutting plants	30 minutes
Postharvest	10 % of bouquets entering.

Source: ICA, 2016a

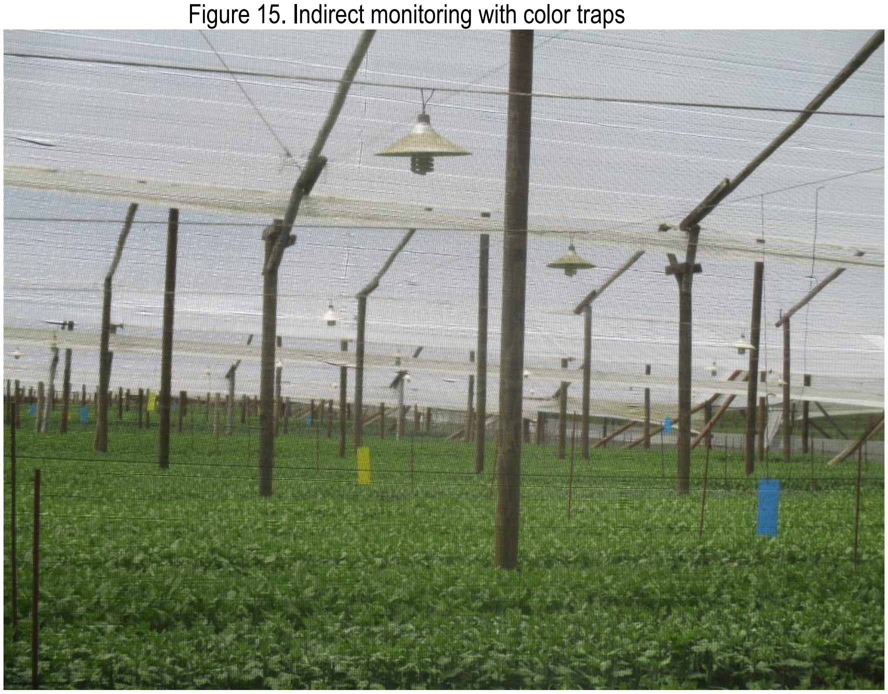
In addition, it is necessary to indicate that, in order to guarantee the adequate monitoring of this disease, a program of simulations of the appearance of white rust symptoms is implemented within the work of the crop in order to improve the responsiveness and alertness of the personnel. monitoring the presence of this pathogen, which is implemented by placing physical representations of the symptoms on the leaves of the plants in all the areas of the crop covering all the stages except the plants in court so that any person who finds the representation of the symptom it reports to its immediate superior. These representations are renewed every two weeks, rotating their location, and those that were not found and reported are eliminated (ICA, 2016a).

Considering that the design precision for pest management depends on the quality of the work of the monitors, the personnel who do it receive intensive training given by the agronomists and the support provided by the National Service of Learning (SENA)), which is the public institution in charge of offering complementary training programs for the technical training of human resources in Colombia (CI Flores de la Vega, 2017, CI Florco, 2017 and Flores Esmeralda, 2017). For the specific case of white rust monitoring, the format established relates the location, find and withdrawal of the physical representations in order to calculate the percentage of findings of the representations (ICA, 2016a).

- Indirect monitoring

In indirect monitoring, traps are used that are read weekly. This is focused on the detection of miners and F. occidentalis, which are attracted by squares of yellow and blue, respectively, which are located inside the uniformly distributed greenhouses (CI Flores de la Vega, 2017; Florco, 2017, Flores Esmeralda, 2017).

Figure 15. Indirect monitoring with color traps



Source: ICA, 2017b.

As part of a compulsory detection, prevention and contingency plan, in Colombia, ornamental export production sites are obliged to monitor Thrips palmi Karny by means of external traps located at the four corners of the production site (1 North, East, South and West. these are read, quantified and cleaned twice a week in such a way that the monitor must count and record the number of thrips in the respective format (Annex No. 1), after which the PVC tube must be cleaned with a towel and soapy water, dry and apply a coat of oil. The format must be signed by the technical assistant and sent weekly to the ICA; every 6 weeks, in addition to the completed format, the sample of thrips harvested that week must be sent to the ICA laboratory. With the aid of a brush, the monitor should carefully remove the thrips from each of the traps and place them in an alcohol bottle (ICA, 2008, ICA - ASOCOLFLORES, 2005).

All the information collected during all the monitoring is recorded in the formats established by the technical assistant to analyze them, visualizing the phytosanitary status of each of the areas of the crop and, in this way, to generate the corresponding management program (CI Flores de la Vega, 2017;
C.I. Florco, 2017; Flores Esmeralda, 2017).

7 Harvest, postharvest, packaging, storage and transportation activities.

The exporting, marketing, packing and related companies of cut flower of chrysanthemum must be registered before the ICA complying with the resolution No. 492 of 2008. They must also have a technical assistant who is responsible for the phytosanitary status of the offices (ICA, 2008).

Table 6. Processes from pre-harvest to postharvest of *Chrysantemum* spp.

Operation	Description
Pre-harvest	At least one week before the processing of the flowers and to maintain the control of pests that can affect the sanity and quality of the product a last monitoring is realized in the place of production; from the phytosanitary status of the lot to be exported, appropriate management measures are taken including the disposal of the lot if necessary.
Harvest	The semi-open flowers are cut according to the length required by the consumer and are made with scissors or blades with a suitable edge, which are disinfected with a solution of sodium hypochlorite 3% or 70% industrial alcohol. Each bouquet is located inside a cap headed with macroperforations, which protects foliage and flowers from mechanical damage; the cap specifications may vary depending on the customer's requirement. The bouquets are arranged inside buckets with a moisturizing solution plus a bactericide. The transport to the postharvest is carried out, in an agile way, in structures pulled by a tractor, that allow the easy placement of the buckets, in order to reduce the risk of dehydration of the product. Also, these wagons have a cover so that the flowers are protected from rain and direct rays of the sun (Figure 15)

<table>
<tr><th colspan="2">Operation</th><th>Description</th></tr>
<tr><td colspan="2"></td><td>Figure 16. Structure with buckets for the transfer of the harvested branches.

Source: ICA, 2017b.</td></tr>
<tr><td>POST HARVEST</td><td>Reception</td><td>The area destined to the postharvest is totally guarded and with guarantees to maintain an adequate cleaning, organization and measures that avoid the contamination of the product.

In case the company sells flowers from places of external production sites, an independent reception and monitoring area must be in place so that the own and external products are entered and inspected separately to ensure that all the material complies with the phytosanitary standards without risk of contamination.

In order to reduce metabolic activity, flowers are received and placed in a cool place.</td></tr>
</table>

Operation		Description
		Figure 17. Entry to post-harvest zone.  Source: ICA, 2017b.
	Monitoring	The branches are processed in the same order of arrival, from the buckets to the post-harvest area. Once the product has been identified in the sheets, a 10% monitoring of the branches is carried out by shaking the stems with care not to mistreat the leaves on a white table equipped with light and magnifiers (Figure 17). Figure 18. Post-harvest monitoring  Source: ICA, 2017b. If no pest is detected, processing is continued. In case of detection, depending on the species and quantity found, the decision is made to monitor the material 100% or to submit it to treatment. In addition, monitoring in wet chambers and vase tests:

<table>
<tr><th>Operation</th><th>Description</th></tr>
<tr><td></td><td>

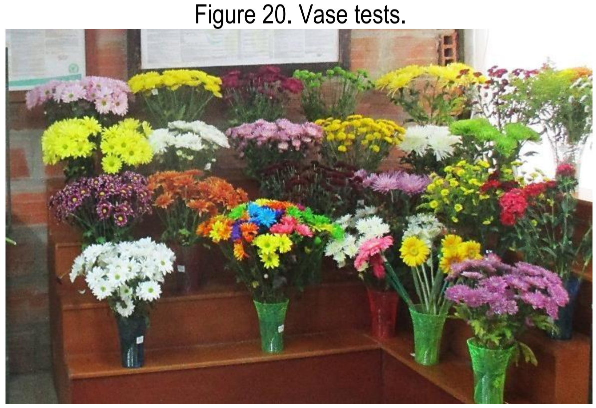
- The first consists of an assembly where moisture is stored to identify the possible presence of Botrytis, since the condition of high relative humidity and temperature accelerates the metabolism of this pathogen. Once a week, flower stems collected from different lots are taken and deposited, keeping all the traceability and seven days after the assembly in a humid chamber, the flowers are evaluated and the respective format is performed (Figure 18).

Figure 19. Mounting in wet chambers.

Source: ICA, 2017b.

- The vase tests are performed with a "trip simulation" where the flower is stored in a cold room for 15 days, then a new cut is made to the stem, the cap is removed from the branches and placed in the vases with a monitoring daily for 15 days, completing the vase life evaluation sheet. This procedure helps to evaluate the quality of the flower that reaches the customers (Figure 19).

Figure 20. Vase tests.



Source: ICA, 2017b.

</td></tr>
<tr><td>Treatment</td><td>If considered accurate, some companies pass the material by treatment with Magnesium Phosphide, which is registered before the ICA (ICA, 2017c). This treatment is performed in a cold room for 17 hours at night to prevent the molecule from contacting the company staff.</td></tr>
</table>

Operación	Descripción
	It is done under the guidelines of the technical assistant and considering all the necessary safety measures and with a monitoring of concentration of particles to detect risks (C.I. Flores de la Vega, 2017, C.I. Florco, 2017, Flores Esmeralda, 2017).
Quality control and packaging	Simultaneously a quality control of the product is realized verifying the length of the stems and eliminating flowers that do not meet the parameters of quality or some buttons aesthetic for the branch. If the customer requires it, at this point bouquet are assembled, according to their preferences which are packed in hoods monoriented according to the specifications agreed. The branches are placed in boxes depending on the size required by the importer can be 50X20X105cm or 90X60X18cm, which can fit about 40 branches and are organized on pallets of 48 boxes (CI Flores de la Vega, 2017, CI Florco, 2017 , Emerald Flowers, 2017). Figure 21. Armed and unarmed boxes for chrysanthemum packing.  Source: ICA, 2017b.
Refrigeration	The boxes are brought to a cold pre-cooling room with a temperature ranging from 12 to 14 ° C for 20 minutes. Later, these are transferred to another cold room with temperatures between 2 and 4 ° C, and a relative humidity of 80% of this point the flower passes to the containers avoiding breaking the cold chain (CI Flores de la Vega, 2017, CI Florco , 2017, Flores Esmeralda, 2017). Figure 22. Cold room with flower cut from chrysanthemum.  Source: ICA, 2017b.

Source: C.I. Flowers of the Vega, 2017; C.I. Florco, 2017; Flowers Emerald, 2017.

In order to ensure asepsis of the post-harvest room and in general of its work tools, the production sites carry out cleaning and disinfection procedures with different frequencies as required; with regard to inspection tables, sorting tables and boncheo, tools, guillotines and knives, a cleaning and disinfection is carried out before starting the work, at noon and at the end of the working day. The post-harvest room and cold rooms are disinfected once a week.

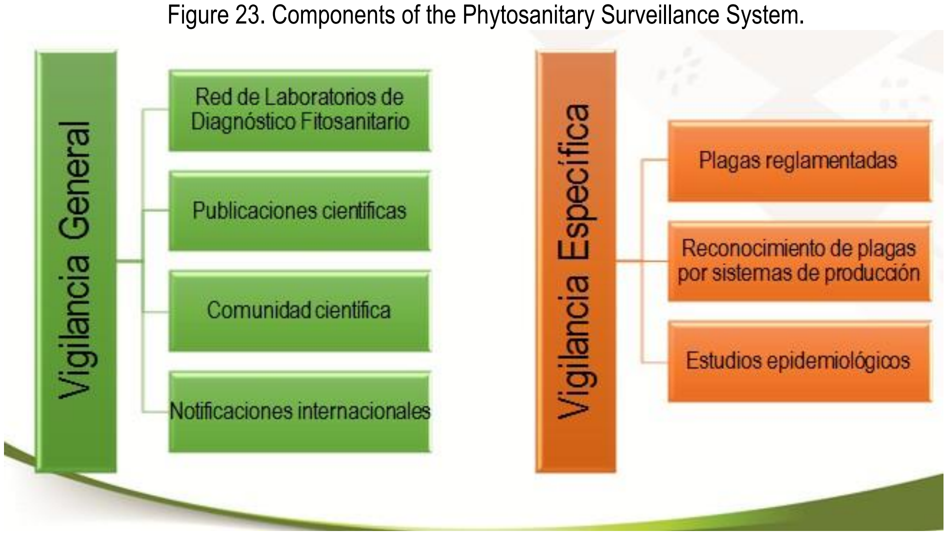
Exporting companies must have a traceability system that allows them to specifically verify the farm from which the flower, volume and country of destination originates. In the same way, they must provide for each shipment of the phytosanitary record, issued by the professional responsible for the health of the material being exported and / or phytosanitary certification issued by the ICA (ICA, 2008).

8 Official phytosanitary certification programs and information on surveillance systems.

Phytosanitary surveillance is an official process that is carried out dynamically and continuously. It includes evaluation, monitoring and other processes with technical-scientific support, which allow to determine the presence or absence of pests in the national territory. It has the permanent support of professionals and Phytosanitary Diagnostic Laboratories.

The Phytosanitary Surveillance System of Colombia is conformed by processes of General Surveillance and Specific Surveillance. The General or Passive Surveillance is done by obtaining information through different sources (publications, congresses, reports, sensors), in relation to a particular pest. The Active Surveillance or Specific Survey is in which procedures are used to obtain information (monitoring) with respect to a particular pest, in specific sites of an area and during a determined period of time. Active surveillance applies to regulated pests established through Resolution ICA 3593 of 2015 (ICA, 2015b; ICA, 2017c).

Figure 23. Components of the Phytosanitary Surveillance System.



Source: ICA, 2010.

With regard to the pests referred to in Annex 2 of the Australian questionnaire format developed in the present characterization, the following pests are quarantine absent in Colombia, as established in Resolution ICA 3593 of 2015 *"by means of which the mechanism to establish, maintain and update the list of regulated pests of Colombia."*

Virus

Pelargonium zonate spot virus (PZSV)
Tobacco streak virus (TSV)

With respect to the other pests referred to in Annex 2 of the Australian questionnaire format developed in the present characterization, which are listed below, it is reported that according to the results of the phytosanitary surveillance system are plagues absent in Colombia.

Virus

Chrysanthemum stem necrosis virus (CSNV)
Impatiens necrotic spot virus (INSV)
Potato virus Y $^{M-Wi}$ Strain

Viroid

Chrysanthemum chlorotic mottle viroid (CChMVd)

Nematode

Aphelenchoides ritzemabosi

Unknown

Chrysanthemum phloem necrosis disease (CPN)

In relation to Ca: Phytoplasma asteris, Tomato ringspot virus (ToRSV) are pests present in the country. However, the national phytosanitary surveillance system has not detected the presence of these in commercial *Chrsanthemum* spp.

Legal Control

Both the production sites (estates) and exporting companies (traders) of pink cut flowers that want to export must register their places of production (land) before the ICA through resolution No. 492 of 2008 "For which lay down provisions on plant health for species of ornamental plants "; since only the export of registered places of production and marketers is allowed. The places of production and the registered merchants have technical assistance obligatory by an Agronomist or Agronomist with a professional card. It is responsible for the establishment of a permanent pest detection and monitoring program in accordance with the plans for the detection, prevention and contingency of pests of quarantine importance. In addition, registered production sites are required to submit a quarterly report on the phytosanitary status of the crop before the ICA and to provide for each shipment or movement of flowers, the phytosanitary certificate issued by the professional responsible for the health of the material being exported (ICA, 2008).

Exporting companies are obliged to export cut flower exclusively from crops that have technical assistance and certificate of registration of the place of production or exporter registration in force. They should also (ICA, 2008):

- - Have control records (invoices, records, documents and forms) that support the provenance of cut flower used by the company for export purposes.
- - Have the necessary infrastructure for the reception, classification and packaging of the flower to be commercialized.
- - Have the phytosanitary certificate for each of the shipments, issued by the professional responsible for the health of the material object of export and / or Phytosanitary Certification issued by the ICA.
- - Monitor and apply the pre-export control measures available for the technical management of quarantine pests in classification or post-harvesting rooms.
- - Submit a quarterly report, of the exported species, volume and country of destination to the corresponding ICA section.
- - Have a technical assistant to answer for the phytosanitary status of the offices.

The officials of the Technical Department of Plant Protection of the ICA, exercise control of compliance with the provisions established in the aforementioned resolution, through periodic visits to the different places of production and marketing of ornamental species destined for export or the national market (ICA, 2008).

Table 7. Phytosanitary regulations in the interior of the country for the cultivation of interest.

Records before the ICA
Resolution ICA 492 of February 18, 2008. Provisions on plant health for species of ornamental plants https://www.ica.gov.co/getattachment/63a9e0bd-eb11-404a-bbb3-2c4ddc87f38e/2008R0492.aspx
Resolution ICA 3168 of September 7, 2015. By means of which it regulates and controls the production, import and export of seeds resulting from genetic improvement for marketing and planting in the country, as well as the registration of agronomic and or breeding research units and other provisions. http://www.ica.gov.co/getattachment/4e8c3698-8fcb-4e42-80e7-a6c7acde9bf8/2015R3168.aspx
Regulated pests and contingency plan
Resolution ICA 3593 of October 9, 2015. By means of which the mechanism to establish, maintain, update and disseminate the list of regulated pests of Colombia. http://www.ica.gov.co/getattachment/a6a72675-e009-42f7-8c25-89b406e494d9/2015R3593.aspx
Resolution ICA 20008 of March 18, 2016. By means of which it establishes the contingency plan of the white rust of the chrysanthemum (Puccina horiana Hen) in Colombia. https://www.ica.gov.co/getattachment/0d4d1557-197f-4de0-8e55-f9293cc71c1d/2016R20008.aspx
Free Areas [1]
Resolution ICA 2965 of August 28, 2008. By which it is declared as free area of white rust of the chrysanthemum (Puccinia horiana Henn) to the department of Antioquia and establishes phytosanitary measures for its maintenance. https://www.ica.gov.co/getattachment/87b8c227-e044-4534-a44d-943b1d4d01b4/2008R2-1.aspx
Resolution ICA 5313 of December 26, 2011. By means of which the Department of Quindío is declared as Free Area of White Rust of Chrysanthemum (Puccinia horiana Henn) and Phytosanitary Measures for its Maintenance are established. https://www.ica.gov.co/getattachment/ce1c705e-abe6-4572-b99e-ace6727c8a20/2011R5313.aspx

1 In the event of an outbreak, the contingency plan established in ICA Resolution No. 20008 of 2016 is activated.

Phytosanitary Certificate for Export (CFE)

The ICA as the National Plant Protection Organization (NPPO) of Colombia issues the Phytosanitary Certificate for Export (CFE) according to the guidelines of the International Standard for Phytosanitary Measures (ISPM) No. 12 - Phytosanitary Certificates, issued by the International Convention on Phytosanitary Measures (IPPC) to protect the shipment and certify that it meets the requirements of the country of destination. The document contains sufficient information to clearly identify the submission, and includes comments if necessary (ICA, 2016b).

The CFE is issued exclusively by authorized quarantine officers at ports, airports and border crossings (PAPF) on the day of shipment, after inspection of the material and verification of compliance with the requirements (ICA, 2016b).

Procedures for the request of the CFE

When the importing country requires CFE, the request must be made by the interested party through the Health Information System for Import and Export of Agricultural and Livestock Products (SISPAP). Subsequently you must present the respective supporting documentation at the place of departure of the shipment so that the authorized quarantine officer can proceed with the inspection of the cargo and if appropriate issue the certificate that covers the dispatch. It is clarified that the exporter only has access to SISPAP once it has fulfilled all the requirements demanded by both the ICA and the NPPOs of the importing countries (ICA, 2016b).

Additional statements

Regarding additional declarations, when the importing country so requires, the exporter addresses a communication to the National Plant Quarantine Group (GNCV) specifying the place of departure of the consignment, country of destination and attached the document of phytosanitary requirements issued by the country in the case in which they issue), or official communication of the NPPO with such information. The CNGV establishes the acceptance criteria that must be met by the exporter and the authorized quarantine officer that can go from the request of a visit to the place of production to evaluate the conditions of production of the materials or products until the carrying out of diagnostic tests certifying the phytosanitary status of the materials for compliance with the requirements of the additional declaration (ICA, 2016b).

Información detallada sobre resoluciones, requisitos para registro como exportadores y funcionarios de contacto pueden ser encontrados en el siguiente link: http://www.ica.gov.co/servicios_linea/sispap_principal.aspx

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ANNEX I

Traps for surveillance of Thrips palmi Karny and detection form (ICA - ASOCOLFLORES, 2005).

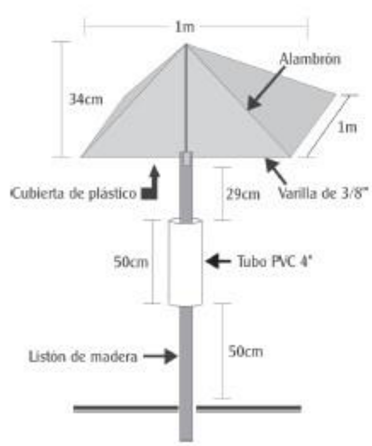
Materials for monitoring

- *Plastic containers with airtight lid for sampling (bottles - Eppendorf 1.5 ml).*
- *Antiseptic alcohol (70%).*
- *Fine tip brush, # 0 or 1.*
- *Pencil.*
- *Labels of paper or white cardboard to label the sample bottle.*
- *Field report forms,*
- *10 or 20 magnification magnifying glass.*
- *Rags*
- *Soapy water*

Trap Specifications

The trap is constructed with a 50-centimeter section of 4 "PVC pipe, which will be painted white. It will be fixed to the ground by an immunized wooden stake of 5 centimeters of side and 1.8 meters of height. The trap shall be placed vertically above the ground, 50 centimeters apart, between the lower edge and the floor surface. The stake should go through the tube light (to the inside) so that the entire white surface is exposed. The tube will be impregnated with 20W-40 / 20W-50 motor oil without burning, as colorless as possible, which will be the adhesive for the capture of the pest.

The trap will be protected by a plastic cover of the same specifications as that used for the construction of greenhouses. This will have an area of 1 square meter, four waters and a central axis height of 34 centimeters. For the construction of the deck, 3/8 "rod will be used in the central axes, 5 centimeters of 1" galvanized pipe to anchor the deck on the wood stake. The rest of the structure will be constructed with 1/8 "galvanized wire. The purpose of the cover is to only protect the trap from the effect of rain.



Exterior Trap Scheme

Form for the Weekly Thrips Detection Report

FORMULARIO PARA EL INFORME SEMANAL DE DETECCIÓN DE THRIPS			
FECHA	SEMANA	FINCA O PREDIO	
INFORMACIÓN SOBRE CAPTURA DE THRIPS (El cuadro se llena con el número de Thrips capturados en las trampas)			
TRAMPA #	1er. DIA	2do. DIA	TOTAL
TRAMPA 1			
TRAMPA 2			
TRAMPA 3			
TRAMPA 4			
		TOTAL	
¿Envía muestras de trampas externas?		Si	No
¿Envía muestras de monitoreo interno del cultivo?		Si	No

El asistente técnico del cultivo en ejercicio de su cargo hace constar que la información contenida en este formulario se ajusta a la verdad.

Nombre ______________________ Firma ______________________

Observaciones ICA______________________

Funcionario ICA que recibe

Nombre ______________________ Firma ______________________

Fecha de recibo: