FLORVERDE
SUSTAINABLE FLOWERS

Methodological Guide for Measurement of Indicators of **Florverde Impact, Monitoring, and Evaluation System**

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for Measurement of Indicators of
Florverde Impact, Monitoring, and Evaluation System

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Design and layout
Equilibrio Grafico Editorial Ltda.
First edition 2011

Second edition 2021. In digital format.

With support of:

asocolflores
Asociación Colombiana de Exportadores de Flores

Cite as: Vivas Segura, A. J. and Vera Ardila, M.L. (2021). Methodological Guide for Measurement of Indicators of Florverde Impact, Monitoring, and Evaluation System. **Florverde Sustainable Flowers.**

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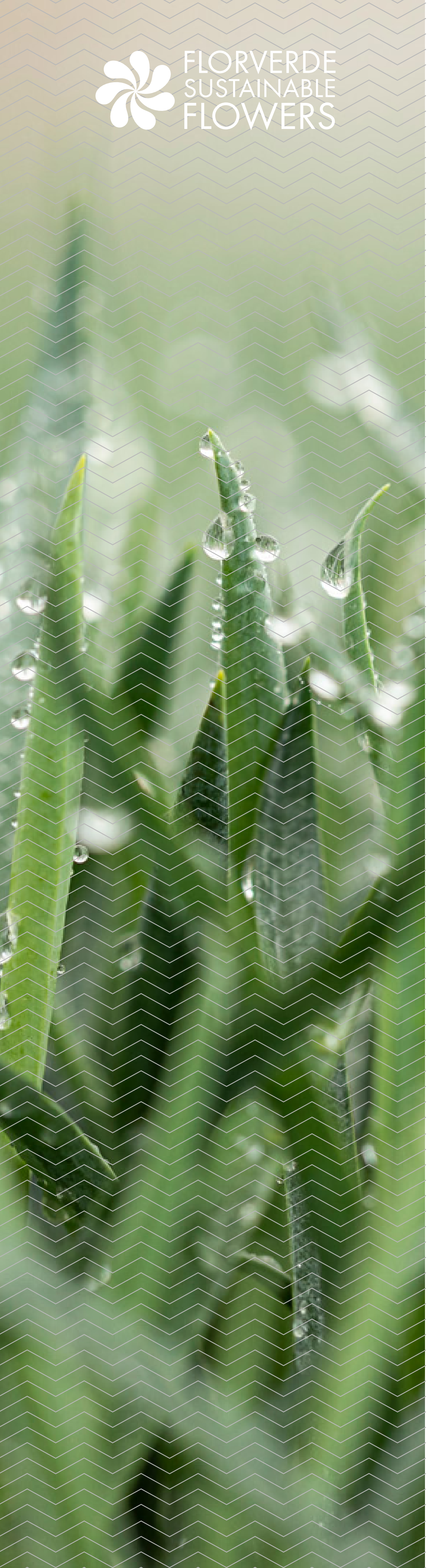
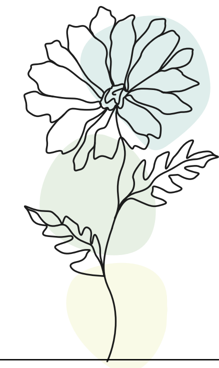


Introduction

The Impact, Monitoring, and Evaluation System (IMES) has become a fundamental tool to monitor social, environmental, and economic performance of companies, in key aspects of flower production.



Indicator management began in 1998 with the measurement of pesticide consumption and, since then, various parameters have been integrated into processes related to water and energy consumption, absenteeism, among others. In 2010, in the first edition of the *Indicators Guide*, methodological sheets were consolidated for fifteen indicators, which cover priority environmental and social aspects.

Over time, other sustainability indicators have been added, complementing what is related to sustainability, from the *Methodological Guide for Measurement ofIndicators of the Florverde Impact, Monitoring, and Evaluation System.*

Therefore, while following the same structure of guide published in 2010, we present a strengthened set of indicators that allows us to respond to the performance and impact of sustainability in floriculture.

You will find environmental and social indicators that have been handled in the past, some with adjustments in their form and others with more in-depth adjustments. These changes are highlighted in the methodological sheets; and additionally, 12 new indicators are presented: 3 related to the use of materials and waste management; 8 economic indicators related to water and energy costs, among others; and one associated with staff turnover. With this, we consolidate our 24 floriculture sustainability indicators.

We hope that this document will continue to be the technical guide for excellence when it comes to understanding indicators managed in the Florverde Impact, Monitoring, and Evaluation System –previously called Floriculture Socio-environmental Indicators System–, and thus, support business management to allowcompanies to monitor their performance in various high-impact aspects and with which they will be able to demonstrate to internal and external clients the value of their social, environmental, and economic management.

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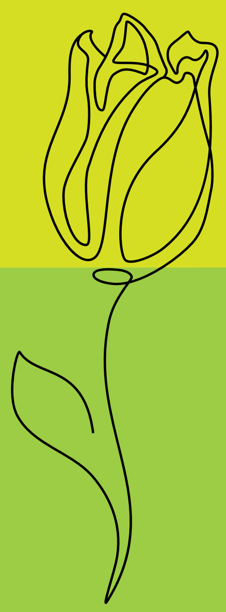


I. Decision-making indicators

What is an indicator

According to the Organization for Economic Co-operation and Development (OECD, 2004), an indicator is "a parameter or a value derived from parameters, that aims to provide information about, and describe the state of, a phenomenon/environment/area, with a significance that goes beyond properties directly associated with the value of the parameter". Given the large variety of existing indicators, OECD recognizes that there is no universal set of indicators, given that each one provides information for different users, purposes, and audiences. An index will then be defined as "a set of aggregated or weighted parameters or indicators"; while a parameter is "a property that is measured or observed" (OECD, 2003, pp. 4-5). According to Ortiz et al. (2004, p. 18), an indicator is defined as "a statistical measure selected for its ability to show a given phenomenon, which is designed and produced for tracking and monitoring purposes." (p. 18).

According to Moncada (2011), indicators are measures that synthesize complex data into a simpler form, and require a context for their analysis and interpretation, given that they record accomplished facts, describe behaviors, and help identify changes in time and space for a given process. A sustainability indicator must integrate variables that facilitate decision-making on social, environmental, and economic aspects; they are complex measures with great explanatory and predictive power. To select an indicator and implement it in a process, it must meet the following minimum criteria:

- **Measurable:** it is capable of being measured;an indicator that is impossible to measure, either due to costs, means, data availability, or any other difficulty in its measurement, is not useful.
- **Unequivocal:** its results point specifically to the aspect for which it has been designed; therefore, avoiding confusion in the interpretation.
- **Well-formulated:** it has all the required formalities, including mathematical formulations, as well as the inclusion of all pertinent variables for the phenomenon to be measured and controlled.
- **Simple:** it must contain only the most pertinent variables related to the phenomenon to be measured, so both its measurement and its interpretation are simple.
- **Generic**: it must be capable of being calculated under similar conditions, regardless of its geographical location or moment in time.
- **Sensitive to changes:** it must be able to show change in the actual process results.
- **Scientifically valid:** it adheres to methods and accuracy criteria accepted by the scientific community.
- **Reliable:** its formulation and forms of measurement and presentation provide confidence to the user who reads and interprets them, in order to guide decision-making.
- **Widely-accepted:** it is recognized in the sector as being useful in terms of planning and decision-making, and is accepted by the community of managers, technicians, and administrators who use it.

- **Strategic:** it is orientated towards sensitive issues for productivity and performance of one or several sectors, and avoids superficial issues.
- **Economically viable:** its measurement and calculation imply a rational cost; it does not exceed the company's payment capacity.
- **Institutional commitment:** it focuses on the company's strategic plan, in turn, contributing to the improvement process.

Implementation of indicators in Colombian floriculture has made it possible to monitor the development of social and environmental processes that affect the well-being of employees, environmental responsibility, and productivity of the company.

Selection of Indicators

Many indicators have been developed for multiple purposes and contexts; for example: performance, management, condition, process, result, impact, evaluation, among others, which offer a wide possibility of choices for any user. Among environmental indicators that follow the OECD proposal (1994) are those of biodiversity, framed in the pressure/state/response model, and have been developed by Alexander von Humboldt Biological Resources Research Institute, in Colombia. This is an old and simple model that helps to identify the direct and indirect pressures on a specific phenomenon.

In this way, some key criteria are proposed for the incorporation of an indicator in a system of indicators (Ortiz *et al.*, 2004):

- **Simplicity:** Various users must be able to understand and apply the indicator.
- **Validity:** Indicators must meet the technical characteristics to guarantee that they effectively measure what theyintend to measure. This criterion is achieved through clear and explicit conceptualization of the definition of the indicator, including its relevance and calculation formula.

- **Availability:** To be calculated, the indicator must have information available or likely to be generated based on available resources. Therefore, the design of viable indicators in terms of their measurement is prioritized, and future indicators are identified, given the impossibility of having the information required for their estimation.
- **Replicability:** The indicator can be measured and verified in a consistent and systematic manner, based on clearly identifiable information, to which the definition, relevance, and calculation formula criteria are applied, and it must be adequately summarized in the respective methodological sheet. Thus, the result will depend on reality and not on the person in charge of carrying out the measurement.
- **Comparability:** The indicator can be measured in different spatial (within the same geographical area) and temporal (simultaneous)) scenarios (p.19).

According to Moncada (2011), in the framework of sustainability indicators there is a division between absolute and relative indicators. An absolute indicator is expressed in the same units as the measurement, such as the number of workplace accidents in a company; while a relative indicator evaluates efficiency in the use of resources, such as averages and rates; for example, the monthly accident rate. The methodology proposed by the Global Reporting Initiative (GRI) (Asocolflores, 2010) contemplates both absolute indicators (total numbers) and relative indicators, which will always be ratios between quantities.

Among the relative indicators are those of eco-efficiency, in which the value of a product or service is related to its influence on the environment; for example, calculation of carbon emissions, which measures the amount of finished product/ton of CO_2 emitted into the atmosphere. Relative indicators can also be used by reversing the positions of the dividend and divisor, in turn, converting into intensity indicators.

Moncada (2011) recommends that, in order to decide what type of indicator should be implemented in a given company and process, the following actions must be taken into consideration:

- Establish indicator objectives and goals.
- Recognize the specificities of the type of process to be measured.
- Clearly identify data collection processes.
- Identify the stakeholders in the information provided by the indicator, and the best way to present the information to them.
- Establish procedures, responsibilities, and formats, as well as the control of information quality, and to involve measurement processes in the routine of the company.
- Document all aspects related to the indicators.

In addition, once the indicators have been selected, it is essential to guarantee that input data meets certain quality parameters that account for good practices in data management. According to ISEAL (2014), parameters to consider are relevance, consistency, completeness, , precision, timeliness, and availability.

Now, if you want to implement sustainability indicators, you must take into account the following considerations in order to guarantee their success:

- Obtain management support as institutional backing in the indicator measurement process, and as beneficiaries of its implementation.
- Get farm staff support in order to have periodic data in a timely and accurate manner for the calculation of indicators.
- Consider various operations in different geographical locations; the system must be flexible.
- Avoid the use of many indicators; an excess of indicators can lead to confusion in their interpretation, or to contradiction.

When implementing indicators, it is essential to include them in the business culture, in the daily life of employees and processes. If a company has a sufficient set of indicators and their measurement is internalized in the work of the employees and the company, it will have powerful tools to help make strategic decisions and, thus, improve its performance in environmental, social, and economic terms.

Methodological Basis

When designing a specific system of indicators, it is necessary that each of the selected indicators be methodologically supported, in turn, making it possible to identify key points and processes that contemplate their calculation or estimation. Only through adequate technical documentation of each indicator is it possible to guarantee replicability and comparability in multiple situations, as well as its monitoring over time.

According to Jennings et al. (2020), indicators can be used to define the scope of a sustainability system, monitor performance, and assess impact. Consequently, they must be clear about their methodological basis to ensure that they are comparable and scalable.

The instrument used in the Florverde Impact, Monitoring, and Evaluation System to describe each indicator is the methodological sheet on which the basic characteristics are recorded, so the rigor required to have quality information is observed, and at the same time, it can also be replicated in similar contexts in the flower sector. With complete documentation of each indicator, there is a way to implement standardized sustainability information systems for various production processes.

The methodological sheet model implemented includes information described in the following table.

1 Indicator Name

1	Name of the Indicator	This field contains the full Name of the IndicatorName of the Indicator, along with its statistical name. It must refer specifically to the variable to be measured; for example: indicator of consumption of active ingredient of chemical pesticides (Cia).
2	Definition	A statement that answers the question, "What does this indicator measure?".
3	Objective	The purpose or intention that motivates the design and implementation of an indicator is stated in the form of one or several actions that motivate its measurement. It answers the question, "Why do we want to measure this indicator?".
4	Indicator Formula	The representation of the indicator as a statistical formula, with its corresponding and adequate notation, in such a way that it helps to identify relationships established between variables involved, while following a calculation route under equal conditions, for example: $CHf = \frac{Hf}{Ap}$
5	Description of Variables	An enumeration of all variables involved in the formula, so that its users understand the statistical notation used. For example (in the case of point 4), Hf: volume of water captured for flower production (lps); Ap: productive area (ha).
6	Unit of measurement	The unit resulting from application of the formula for a specific case. For the above example, the unit of measurement is liters per second, per hectare (lps/ha).
7	Measurement Methods	This point describes activities and instruments required to periodically measure data in the field, so that its replicability in similar contexts is as precise as possible.
8	Form of Presentation	The possible ways in which the indicator can be represented are described, so that it is visually and conceptually understandable by potential users. Iindicators can be presented as figures, different types of graphs (histogram, pie, scatter, among others), or in new specialized software designs (statistics, plotter, web pages, among others), according to the type of resulting data, as well as with the synthesis capacity offered by some types of graphs for specific informative purposes. This field must contain an example.
9	Periodicity in Data Measurement	The data must be measured monthly in the flower farms, given that this temporality is associated with all administrative processes in the farm.
10	Indicator Interpretation	This field must contain a description of the specific meaning of the result of the indicator's application; that is, it mentions the most important points that a user must observe in the graph to correctly understand the calculation made; in turn, highlighting its potential usefulness to make informed decisions regarding the indicator's objective.
11	Observations	In this field, all particularities and precautions that must be observed in any of the steps contemplated in the application of an indicator are consigned, when applicable, to guarantee its quality, as well as its explanatory and predictive power.
12	Sources of Information	The people or institutions that provide basic data required to calculate the indicator are mentioned.
13	Relationship with Other Indicators	This field relates the indicator to other indicators of the Florverde Impact, Monitoring, and Evaluation System with which it shares variables, or between which causal relationships can be established in order to give greater explanatory power to a specific phenomenon. Other existing indicators in fields other than floriculture can also be mentioned, in the context of the indicator in question.
14	Responsible Entity or Group	This space contains the full name of the person or institution participating in the conceptualization and design of the indicator.
15	Year of Elaboration	The date in which the methodological sheet was originally designed.
16	Date of Last Update	The last date in which some aspect of the indicator was updated.
17	Secondary Sources	Bibliography used in the elaboration of the methodological sheet.

Analysis of Indicators

One of the purposes of implementing indicators in a process is so that they can be analyzed for decisionmaking. In other words, indicators alone do not offer the solution to problems; people must extract from them as much information as possible to implement actions that help improve the performance of a process, in this case, a flower production process.

In the analysis of indicators, company's personnel who are most suited to manage topics dealt with must participate, including directors, technicians, and process managers, who have first-hand knowledge and are directly involved in the daily (current and future) operations of the company.

At this level of analysis, variations of the indicator over time and their possible technical explanations can be identified, as well as establishing performance levels using central tendency measurements (average, standard deviation, among others), as a way of measuring the processes involved. Trends or anomalies can also be identified in certain aspects in order to make decisions to optimize them.

At another level of analysis are managers who, when having reliable data over long periods of time, can adopt strategies to reduce costs and improve the company's social and environmental performance, while, at the same time, they have figures and graphs which allow them to manage the company. Some of the questions to be answered in this analysis are listed below and may be answered if the information and technical capacity are available:

- What is the total monthly or annual value of the indicator?
- What is the average monthly and annual value?
- In which months (and years) were extreme values of the indicator presented?
- Why were there such extreme values?
- Does the monthly average increase or decrease each year?
- What is the trend of the indicator?
- At what rate does the trend of the indicator increase or decrease?
- Between what ranges is the variability of the indicator data?
- What is the company's position with respect to other companies that are measured by this indicator?
- What is the sector's average for the indicator? Is the company above or below this average?

- How much does the increase or decrease in indicator values cost the company?
- What might be the causes of variation of the indicator as a function of time?
- How can performance of indicators be improved by managing the identified causes of variation?

By evaluating these questions periodically with the technical and managerial team of flower farms, it is possible to ensure that the proposed set of indicators has an effective impact on the company's decision-making; a sign of its commitment to improving workers' conditions and environment.

At another level of analysis is the authority that can, globally, try to clarify processes associated with the proper management of resources by the group of companies that manage information. This authority could be Asocolflores, the Technical Secretariat of the Florverde Certification Scheme, or floriculture business groups.

With the information managed in these analysis groups you can:

- Have a general overview of the behavior of the sector, certified companies, or the business group, in terms of the use of certain resources that are being monitored.
- Plan actions to improve the sector, improve the group of certified companies, or improve business groups.
- At a sectoral level and at the level of certified companies and business groups, represent stakeholders based on information that accounts for the performance of companies in the use of resources that are being monitored and evaluated.

Despite having a tool that allows the generation of graphs which support the analysis of the farm, we are aware of the need for flower companies to carry out a more detailed analysis associated with their operation, using data managed through the Impact, Monitoring, and Evaluation System, but also integrating other variables. Therefore, as an attachment to this Guide, a directory of useful resources is presented (Attachment 1) for the use of *Microsoft Excel*, which show you how to execute simple data processes.

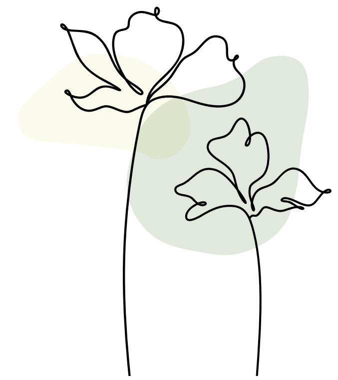
II. Florverde Impact, Monitoring, and Evaluation System (IMES Florverde)

Floriculture indicator system such as the Florverde Impact, Monitoring, and Evaluation System (IMES Florverde)

The Impact, Monitoring, and Evaluation System (IMES) has been implemented as the Sustainability Indicator System for Colombian Floriculture since 1998, initially in Asocolflores, with the purpose of supporting business management to monitor performance of farms in various aspects of high impact and with which they will be able to demonstrate to internal and external clients the value of their social, environmental, and economic management. In that same year, the system was adopted by Florverde Sustainable Flowers as its business sustainability management tool and certified companies started managing their own data.

The first indicator implemented was the consumption of chemical pesticides measured in active ingredient (AI), and over time those of water, energy, absenteeism, accidents, severity, carbon footprint, turnover, economics, among others, were included.

IMES aims to continue to be a reference for monitoring performance of floriculture farms with respect to management of fundamental resources for productive activity, while taking an extra step on a global level when it comes to carrying out more complex analyses that integrate information which helps make decisions in the company that respond to, not only internal managerial needs, but also external transparency in terms of performance and the market.



Validation of impact measurement, monitoring, and evaluation should be aligned with international initiatives to demonstrate greater transparency and better comparability. For this, the ISEAL code of good practice (ISEAL, 2014), which defines principles that must be met by sustainability information systems, was selected. These principles, which are described below, are accepted, and complied with by Florverde IMES.

- **Sustainability:** there is an IMES implemented which helps measure the effectiveness of the standard in terms of achieving its sustainability objectives.
- **Improvement:** IMES results are integrated in order to improve the structure and operation of the standard in terms of its contents or other strategies.
- **Rigor:** procedures are in place to ensure the quality of performance monitoring data.
- **Transparency:** information outlets and impact assessments are made publicly available.
- **Truthfulness:** results and impact claims are based on information generated through performance monitoring and evaluation.

Currently, Florverde IMES is a tool that makes it easier for companies to manage information on their performance in terms of sustainability, through standardized methods of data capturing and processing, as well as the use of controlled languages.

Indicators contained in the Florverde IMES are a tool that allows timely evaluation of individual and sectoral performance in environmental, social, and economic aspects. This information is used to design strategies for the implementation of good environmental and social practices. On the other hand, information provided by Florverde IMES facilitates the representation of floriculture before stakeholders at local, regional, and international level, with timely and reliable figures.

Elements addressed in the Florverde IMES establish it as a sustainability indicator system. Even though individual indicators refer to specific aspects of floriculture farms and their production processes, in general, they consider sustainability variables aligned with the environmental, social, and economic sectors.

With this type of impact measurement system it is always important to keep in mind that many of the problems associated with sustainability must be measured and reported on a larger scale than just the site providing the data. Hence, the importance of an IMES that can group many producers and give a representative vision of the regional reality and performance and impact on the use of different resources.

Data management and the generation of indicators will allow the contributing companies to give declarations, based on comprehensive data, that responds to the reality of their processes. Indicators evidenced here present a variety of aspects that can be highly relevant and "can be used to credibly measure and report performance over time and at multiple spatial scales". (Jennings et al., 2020).

This new edition of the indicator guide has been developed with the purpose of aligning sustainability indicators with global initiatives that address these metrics within the IMES framework. It presents 24 indicators divided into three groups: environmental, social, and economic indicators, which are detailed below.

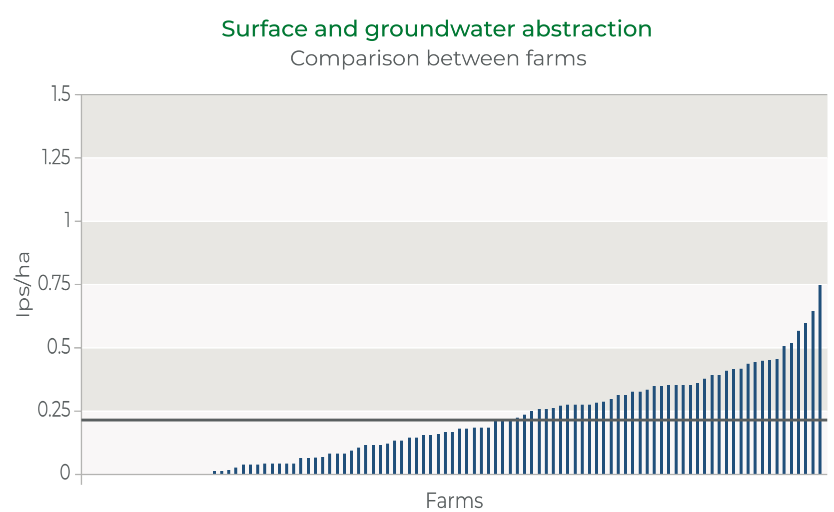
For ease in understanding the methodological sheets, the following conventions are included next to the title: (I) to identify if the indicator remains the same as the 2010 version of the guide; (CA) to identify if adjustments have been made, and (N) to identify if the indicator is new.

Environmental Indicators

This set of nine indicators illustrates the farm's performance in terms of water catchment from surface and underground sources, water consumption in irrigation processes, real use of rainwater, energy consumption in the production process that comes from different sources, such as electricity and fossil fuels, chemical pesticide consumption measured in active ingredient by type of crop, direct and indirect emissions, use of materials related towaste generation, as well as generation of conventional, special, and hazardous waste. Thus, the priority aspects that can generate the greatest environmental impact are estimated.

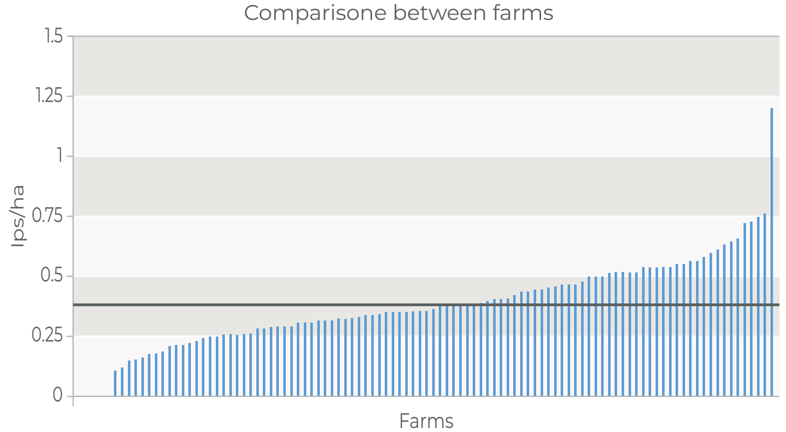
1 Water Catchment Indicator (*CHf*) – I

1	Name of the Indicator	Water catchment from surface and underground sources (*CHf*).
2	Definition	Record the amount of water extracted from surface and underground sources to produce flowers for export, per hectare.
3	Objective	Record the amount of water extracted from surface and underground sources to produce flowers.
4	Indicator Formula	$CHf = \frac{Hf}{Ap}$
5	Description of Variables	H_f: water catchment from surface or underground sources used to produce flowers and ornamental plants, in liters per second (lps). A_p: monthly cultivated area, in hectares (ha). This includes the area planted in a greenhouse or planted outdoors. It does not correspond to the total area of the farm, nor exclusively to the greenhouse area.
6	Unit of Measurement	Liters per second, per hectare (lps/ha).
7	Measurement Methods	Dwater catchment data is measured on the farms, with volumetric valves installed in pipes that extract water from surface or underground sources, as the case may be. Volume is generally measured in cubic meters (m^3); however, if units are different from cubic meters (m3), it is necessary to convert the measurement to register water withdrawal in cubic meters (m^3) in the Florverde IMES. Once the catchment data has been entered into the system, Florverde IMES converts it into lps.
8	Form of Presentation	The indicator is presented graphically, as a histogram of frequencies in which farms that report information each month, are compared.



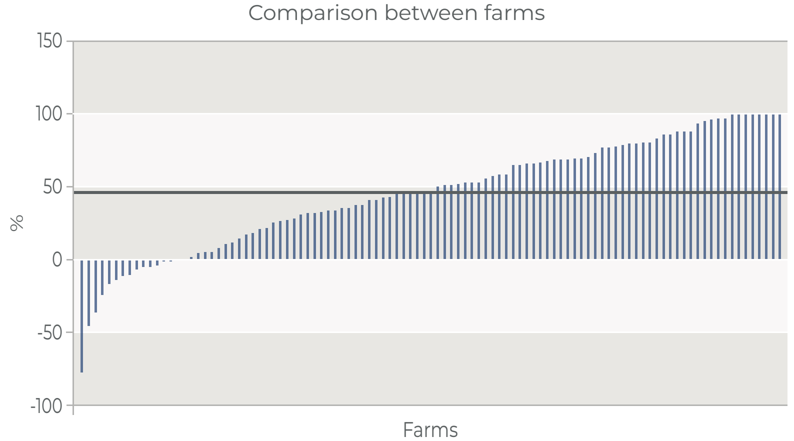
8	Form of Presentation	TIt can also be calculated for one or several farms over any period. In each case, calculation of an average for the analyzed data, as well as its standard deviation, will facilitate the analysis of the indicator.
9	Frequency of Data Measurement	Monthly.
10	Interpretation of the Indicator	When comparing the values of water catchment in different farms, it is possible to identify those with better use of this resource (those that have low values) and those that need water use improvement. Differences between farms may be due to type of flower being cultivated, the planting system, climatic characteristics of each farm during each evaluated period, better water management practices, as well as use of rainwater. If monthly consumption values are compared throughout the year, times in which greater or lower volumes of water were extracted for flower production can be identified. A comparative analysis of averages in consecutive years helps make water consumption decisions forfuture years..
11	Observations	The purpose is to guarantee that companies make rational use of water resources, achieve a reduction in groundwater consumption, and increase the use of rainwater. The way to verify this rational use of water is through the indicator, which allows companies to: ■ Measure amount of water extracted from water sources (surface and groundwater –in the case of the savannah: deep wells–) for production of flowers for export. ■ Measure consumption of water used for the production of flowers. ■ Determine the substitution of tap water by rainwater in companies. ■ Compare water consumption between companies, at regional and union level. ■ Provide information for procedures before environmental authorities.
12	Sources of Information	Floriculture companies.
13	Relationship with other Indicators	■ Water catchment in irrigation. ■ Use of rainwater.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	2001, with adjustments in 2008.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	None.

2 Irrigation Water Consumption Indicator (CHf) – I

1	Name of the Indicator	Irrigation water consumption (CHr)
2	Definition	It measures consumption of water used in the production of flowers.
3	Objective	Measure amount of water consumed in irrigation processes in floriculture farms.
4	Indicator Formula	$CHr = \frac{Hr}{Ap}$
5	Description of Variables	Hr : water consumption in irrigation, in liters per second (lps). Ap : monthly cultivated area, in hectares (ha). This includes area planted in a greenhouse or planted outdoors. It does not correspond to the total area of the farm, nor exclusively to area in a greenhouse.
6	Unit of Measurement	Liters per second, per hectare (lps/ha).
7	Measurement Methods	In each company, water consumption values must be periodically recorded according to the reading of a meter or volumetric valve installed in irrigation stations at the source of water to be used on the crop. The value is usually recorded in cubic meters; if units are different from cubic meters (m^3), it is necessary to make the necessary conversions to record irrigation consumption in cubic meters (m^3) in Florverde IMES. Once consumptions have been entered into the system, Florverde IMES converts them into lps.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that report information are compared. Irrigation water consumption (CHf)- I Comparisone between farms  It can also be calculated for one or more farms over any period. In each of case, calculation of an average for the analyzed data, as well as its standard deviation, will facilitate the analysis of the indicator.

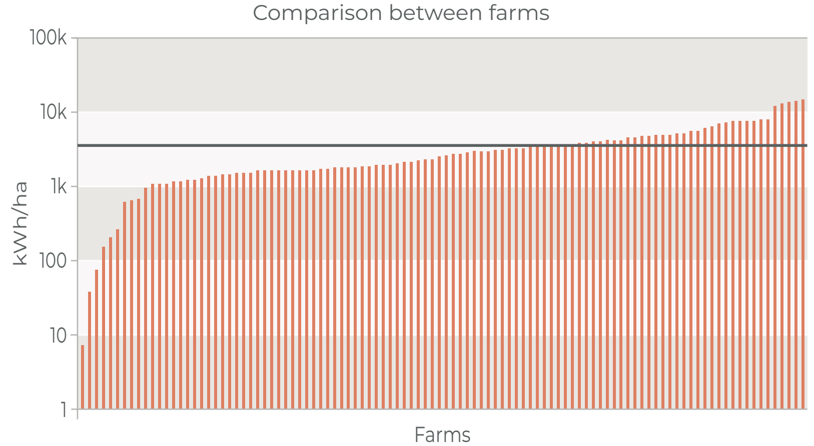
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	By comparing water consumption values in the irrigation process of farms, it is possible to identify which farms have a better use of this resource (those with low values) or those requiring water management improvement. Differences between farms may be due to type of flowers cultivated, the planting system, climatic characteristics of each farm during each evaluated period, or better water management practices. If monthly consumption values are compared throughout the year, times when greater or lower volumes of water used in irrigation can be identified. A comparative analysis of averages in consecutive years offers elements to make water use decisions in the future.
11	Observations	Water is a fundamental input for the production of flowers. Therefore, the measurement of its use through an indicator will allow its consumption to be determined and compared between companies in the same sector in order to propose actions aimed at its conservation and rational management.
12	Sources of Information	Flower companies.
13	Relationship with other Indicators	■ Catchment of water from surface and underground sources. ■ Use of rainwater.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat
15	Year of Elaboration	2001, with adjustments in 2008.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	None.

3 Rainwater Use Indicator (Ah) – CA

1	Name of the Indicator	Use of rainwater (Ah).
2	Definition	Measures percentage of rainwater used in a month, with respect to total water used for crop irrigation.
3	Objective	■ Estimate the proportion of rainwater used in flower irrigation processes on floriculture farms during a specific period, with respect to total water used for irrigation in the same period. ■ Learn how rainwater is used on farms and its behavior over time.
4	Indicator Formula	$Ah = \frac{(Hr - Hf)}{Hr} \times 100$
5	Description of Variables	Hr: water consumption in irrigation, in cubic meters (m^3). Hf: water catchment from surface and underground sources, in cubic meters (m^3).
6	Unit of Measurement	Percentage (%).
7	Measurement Methods	Floriculture farms must record monthly, the amount of surface and groundwater captured, and consumption of water used forirrigation, according to readings of meters installed for each catchment. The value is usually measured in cubic meters; if units are different from cubic meters (m3), they must be converted to register catchment and irrigation consumption in cubic meters (m^3) in Florverde IMES. Once water consumption is entered into Florverde IMES, it is converted into lps.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared.  The indicator can also be calculated to assess water use by individual companies over a year.

9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	One of the following cases may occur: ■ If the percentage is equal to 0%, it indicates that the farm does not take advantage of rainwater and crop's irrigation water needs were supplied by capturing water from surface or underground sources. ■ If the percentage is greater than 0% (positive), it means rainwater is used to irrigate the crops. As the value approaches 100%, the use of rainwater is high, and it becomes the main water source for crop irrigation. From an environmental point of view, this is the ideal situation, given that catchment of water from surface or underground sources is lower and substituted by rainwater. ■ If the value is less than 0% (negative), it means rainwater is not used and more water is captured from surface or underground sources than is required for crop irrigation. This condition is not ideal since water waste is evident.
11	Observations	None.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	■ Consumption of irrigation water ■ Catchment of water from surface and underground sources.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	2001, with adjustments in 2008.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	None

4 Energy consumption indicator (Ce) – I

1	Name of the Indicator	Energy consumption (Ce).
2	Definition	Determines energy consumption by different sources used in the production of flowers and ornamental plants per hectare. Sources of energy considered include, electricity, ACPM, gasoline, gas, and coal. The unit of calculation is kilowatt-hours per hectare (kWh/ha).
3	Objective	■ Quantify total energy consumption in floriculture farms. ■ Know energy consumption depending on its source (electricity, coal, gasoline, etc.).
4	Indicator Formula	$Ce = \frac{\sum Cei}{Ap}$
5	Description of Variables	Cei: consumption of energy sources used in a month, in kilowatts/hour (kWh). Ap: productive area in a month, in hectares (ha). This includes cultivated area (in greenhouse or outdoors), plus other areas of the farm destined to produce flowers (post-harvest, offices, among others).
6	Unit of Measurement	Kilowatt-hours per hectare (kWh/ha).
7	Measurement Methods	The company must quantify energy consumption used in a month from the following sources: ACPM, coal, gasoline, gas, or electricity, and record this information in Florverde IMES, together with the company's production area data.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared, in kWh/ha. Energy consumption Comparison between farms  Each farm can demonstrate its performance, month by month and year by year. Additionally, you can compare your consumption by source and compare it to other farms in the sector.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	By comparing energy consumption values of different farms, it is possible to identify their differential consumption. Differences between farms may be due to type of flowers being grown and the implementation of good energy management practices. If monthly consumption values are compared throughout the year, times when energy consumption was higher in the flower production process can be identified. A comparative analysis of averages in consecutive years helps making decisions regarding energy consumption in future years.
11	Observations	Energy is an important input in flower production from an economic and environmental point of view consideringthe effects of producing and using it. Its measurement by means of an indicator allows companies to determine their consumption and compare themselves with other companies in the same sector. Therefore, the indicator helps promote the companies' ability to measure and identify losses and inefficiencies in the use of energy. Moreover, how these can be remedied through implementation of good practices, such as the use of renewable energy sources (photovoltaic energy). This is reflected in the decrease in consumption and reduction of costs.
12	Sources of Information	Flower companies.
13	Relationship with Other Indicators	None.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	2006.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	None.

5 Indicator of Carbon Emissions in Floriculture Companies

(Business Inventory of Greenhouse Gases - GEI) – I

1 Name of the Indicator

Greenhouse gas emissions in floriculture companies (HC_f).

2 Definition

The production process of flowers and ornamental plants begins with the propagation of plants through the post-harvest, and includes external transportation of harvested products to the embarkation sites (departure airport) and landing sites (arrival airport). Below are some definitions of key terms related to processes and sources of direct and indirect emissions that are taken into account when calculating carbon footprints, taken from WBCSD - WRI - SEMARNAT (2005):

a. **Las emisiones directas:** provienen de fuentes que son propiedad o están bajo control de la empresa que reporta (p. 114).

b. **Las emisiones indirectas:** son consecuencia de las operaciones de la empresa que reporta, pero que ocurren a partir de fuentes que son propiedad o están bajo control de otras empresas (p. 114).

c. **Los fertilizantes son un insumo utilizado en cantidades importantes.** “El papel fundamental de los fertilizantes en la floricultura es proporcionar nutrientes a las plantas para su desarrollo” (Montero, 2010, p. 49). La aplicación de fertilizantes nitrogenados de origen químico u orgánico al cultivo genera óxido nitroso (N2O), que es un gas de efecto invernadero. De igual manera, la aplicación de urea y enmiendas como la cal también generan dióxido de carbono (CO2). Las fuentes de emisión son:

- Consumption of nitrogenous fertilizers (direct emissions).
- Consumption of urea and lime (direct emissions).

d. **Refrigerants:** fluids used to transfer heat to refrigeration systems; these fluids have a high global warming potential and last a long time in the environment, therefore contributing significantly to increase GHG emissions. Consumption of refrigerants in floriculture stems from the use of cold rooms and the transportation of flowers. Emission sources are the following:

- Consumption of refrigerants in the production process and internal transportation (direct emissions).
- Consumption of refrigerants in outsourced transportation (indirect emissions).

The types of refrigerant gases in the production process and internal transportation to be considered are the following: CFC-11, CFC-12, sulfur hexafluoride, R-22, R-407C, R-290, HCHF-22, perfluoro methane, R- 11, R-134A and R-410A.

2 Definition (continued)

e. **Fuels:** derived from petroleum, including oil, natural gas, and coal. In floriculture fuels required for the production process, as well as transportation,are the following:

- Diesel and gasoline: used as a source of energy for machinery and equipment used in the production process (power plants, water pumps, string trimmers, spray machines, among others), and internal and external transportation of flowers (vehicles).
  - Consumption of diesel and gasoline in production processes and internal transportation (direct emissions).
  - Consumption of diesel and gasoline in outsourced transportation (indirect emissions).
- **Natural gas:** used in floriculture farms, mainly for heating processes and as fuel for vehicles.
  - Consumption of natural gas in production processes and internal transportation (direct emissions).
  - Consumption of natural gas in outsourced transportation (indirect emissions).
- **Liquefied petroleum gas (LPG):** mainly used in floriculture processes for heating.
  - LPG consumption (direct emissions).
- **Coal:** used as source of energy, mainly for the operation of boilers, which generates steam for disinfection of soils and substrates.
  - Coal consumption (direct emissions).

The types of coal to consider in this calculation are anthracite, bituminous, subbituminous, or lignite.

f. **Electrical energy:** energy consumption is essential in the production process, given that it is used for the pumping and irrigation of water, cooling and lighting.

Although electrical energy is consumed in the production process, it is considered a source of indirect emissions, since it comes from power generation plants, which must assume direct responsibility over emissions generated.

g. **Air transportation** refers to shipment of flowers from the producing country to any consumption country. Some of the factors to consider for emissions generated by this source include the distance traveled and cargo weight.

3 Objective

- Determine greenhouse gas emissions in the production of flowers and ornamental plants.
- Identify direct and indirect sources of greenhouse gas emissions in the production processes of flowers and ornamental plants.
- Support decision-making to minimize or offset greenhouse gas emissions generated by production processes of flowers and ornamental plants.

4 Indicator Formula

$$HC_f = E_{fd} + E_{fi}$$

$$E_{fd} = R_p + R_{tp} + C_p + C_{tp} + C_{cp} + F_n$$

$$E_{fi} = C_{tt} + E_p + R_{tt} + T_a$$

$$R_p = \sum (R_{ip} \times F_{em})$$

$$R_{tp} = \sum (R_{itp} \times F_{em})$$

$$C_p = \sum (Comb_{cp} \times F_{em})$$

$$C_{tp} = \sum (Comb_{ctp} \times F_{em})$$

$$C_{cp} = \sum C_{cp} \times F_{em}$$

$$F_n = \sum (F_{qi} + F_o) \times F_{em} + \sum (F_{qi} \times F_{em}) + \sum (F_o \times F_{em}) + (U \times F_{em}) + (C_{cal} \times F_{em}) + (C_{dol} \times F_{em})$$

$$F_{qi} = (F_{cqi} \times F_\rho \times F_{[\square]}) + \left(\frac{F_{ce} \times F_{cn}}{1000}\right)$$

$$F_o = F_{co} \times F_{no} \times F_\rho$$

$$C_{tt} = \sum (Comb_{ctt} \times F_{em})$$

$$E_p = E_{cp} \times F_{em}$$

$$R_{tt} = \sum (R_{itt} \times F_{em})$$

$$T_a = (C_{ex} \times A_d \times F_{em\text{-}CO2e})$$

$$C_{ex} = C_{pe} \times C_{nu}$$

5 Description of Variables

HC_f : indicator of greenhouse gas emissions (CO_2-eq).
E_{fd} : total emissions from direct sources.
E_{fi} : total emissions from indirect sources.
R_p : refrigerant consumption in process.
R_{tp} : consumption of refrigerants in internal transportation.
R_{tt} : consumption of refrigerants in outsourced transportation.
C_p : fuel consumption in process.
C_{tp} : fuel consumption in internal transportation.
C_{tt} : fuel consumption in outsourced transportation.
C_{cp} : carbon consumption in process.
F_n : consumption of nitrogenous fertilizers.
F_{qi} : consumption of inorganic chemical fertilizers (foliar and soil).
F_o : consumption of liquid and solid organic fertilizers.
F_{cqi} : quantity of fertilizers consumed (kilograms or liters).
F_ρ : density of each fertilizer (kg/l).
$F_\square$: concentration of each fertilizer (%).
F_{ce} : amount of complete formula edaphic fertilizers consumed (l).
F_{cn} : nitrogen content of each complete formula edaphic fertilizer (g/l).

5 Description of Variables

F_{co} : amount of liquid and solid organic fertilizers consumed.
F_{no} : nitrogen content (%) in liquid and solid organic fertilizers.
C_{cal} : consumption of limestone (kg).
C_{dol} : consumption of dolomite lime (kg).
E_p : electrical energy consumption in process.
E_{cp} : amount of energy consumed in the process.
T_a : air transportation.
R_i : pounds of refrigerant consumed (lb).
$Comb_c$: fuels consumed (m^3, gal).
C_c : carbon consumed (kg).
F_{em} : emission factor; this depends on variable to be measured, since it is exclusive to each fuel, coolant, etc.
C_{pe} : weight of boxes sent by air transportation (kg).
C_{nu} : number of boxes shipped by air freight.
A_d : distance between departure airport and destination airport (km).
$F_{em\text{-}CO2e}$: emission factor of kg CO_2e/kg-km in air transportation.
C_{ex} : gross weight of exported boxes (kg).
U : urea consumption (kg).

Note: each refrigerant and fuel must be calculated separately, before calculating the sum.

6 Unit of measurement

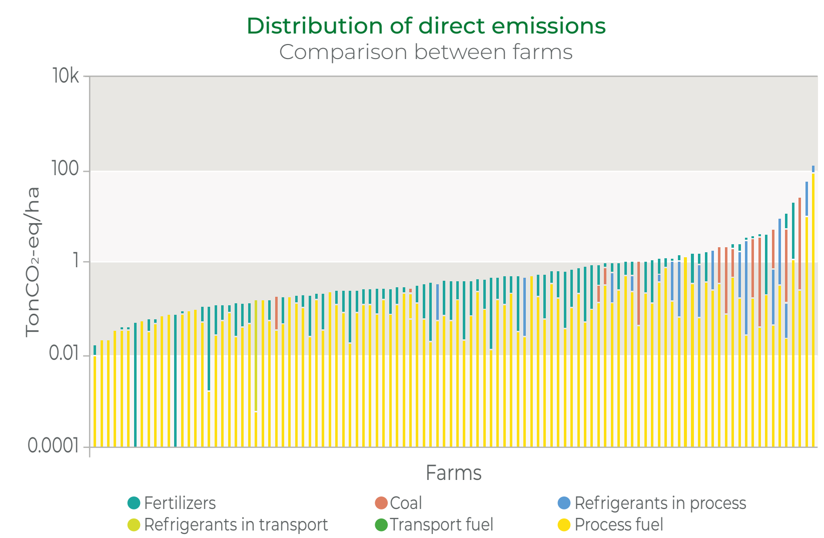
Tons of CO_2 equivalent (CO_2-eq).

7 Measurement Methods

The company must quantify consumption of each input from their monthly records.

8 Form of Presentation

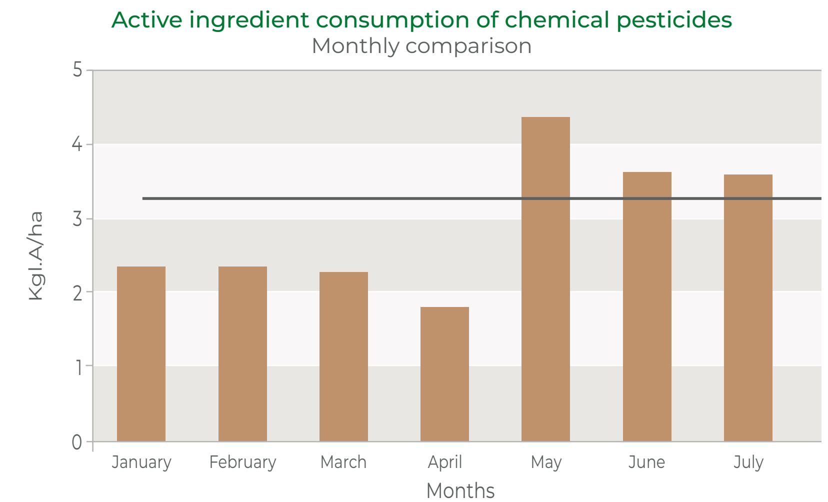
The indicator is presented graphically as a histogram of frequencies comparing farms that reported information each month, tons of CO_2 equivalent (CO_2-eq).

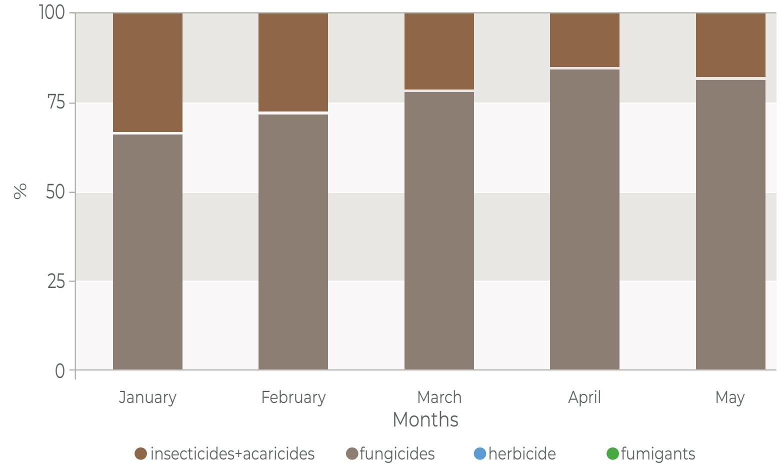


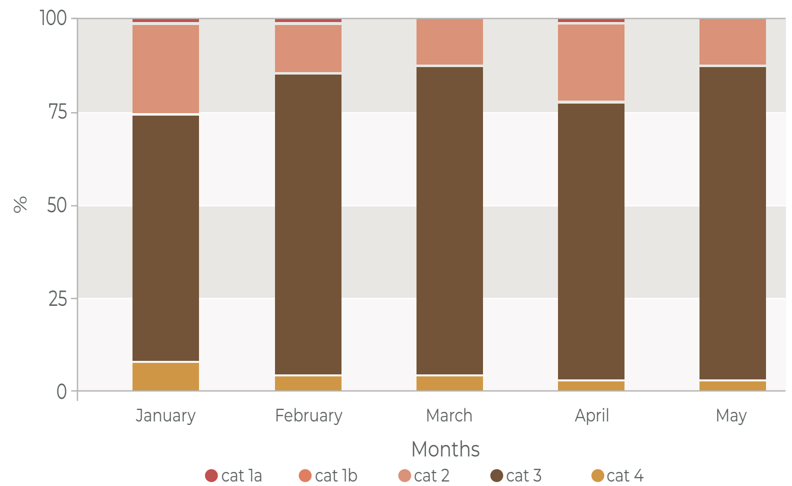
It can also be differentiated by emission sources during different periods (month, semester, year).
Each farm can see its monthly or yearly performance and calculate the amount of direct and indirect emissions.

9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	By comparing greenhouse gas (GHG) emission values in farms, it is possible to identify their differential consumption. If monthly consumption values are compared throughout the year, the periods when GHG emission was higher in the production of flowers can be recognized. A comparative analysis of averages in consecutive years helps companies make decisions regarding emissions in future years.
11	Observations	None
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Power consumption indicator.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	November 17, 2011.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	■ Montero and Quintero (2010). ■ Blackberry (2009). ■ Parrado and Leiva (2011).

6 Consumption of Active Ingredient of Chemical Pesticides (Cia) – I

1	Name of the Indicator	Consumption of active ingredient of chemical pesticides (C_{ia}).
2	Definition	It measures the average amount of active ingredient that corresponds to chemical pesticides applied monthly per hectare, in each of the different ornamental species grown by the company.
3	Objective	Determine the amount of active ingredient of chemical pesticides applied during a given period, in companies that produce flowers and ornamental plants, in order to support phytosanitary decision-making and establish consumption goals.
4	Indicator Formula	$C_{ia} = \frac{\sum (C_a \times CO_{ia})}{A}$
5	Description of Variables	C_a : quantity of commercial chemical pesticide product applied, per month, per cultivated ornamental species (in kilograms or liters). CO_{ia} : concentration of active ingredient of the commercial chemical pesticide used (%). A : area of the ornamental species cultivated in a month (ha).
6	Unit of measurement	Kilograms of active ingredient per hectare (kg a.i./ha).
7	Measurement Methods	The company must record the monthly amount (in kilograms or liters) of each of the commercial chemical pesticide products applied to each ornamental species in the cultivated area.
8	Form of Presentation	Histogram of frequencies that shows the amount of active ingredient of chemical pesticides applied by ornamental species, by company, during a given period (monthly or annually). 

<table>
<tr><td>8</td><td>Form of Presentation</td><td>
Produces comparative graphs of monthly consumption of one or more companies, for the same ornamental species.
In addition, consumption of pesticides can be disaggregated and classified into large groups (insecticides + acaricides, fungicides, nematicides, fumigants, and herbicides).
Pesticide consumption by type
Monthly comparison


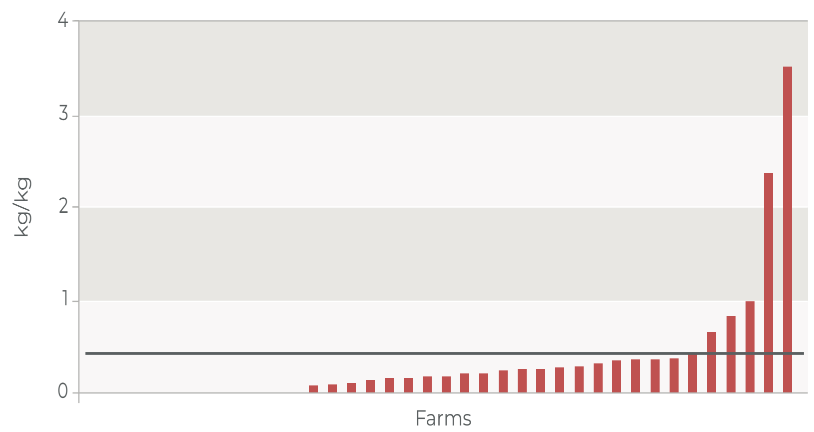
This consumption indicator also makes it possible to display, in a disaggregated manner, the corresponding amounts contributed by chemical pesticides in each of their toxicological categories.
Pesticide consumption by toxicological category
Monthly comparison


</td></tr>
<tr><td>9</td><td>Periodicity in Data Measurement</td><td>Monthly.</td></tr>
<tr><td>10</td><td>Indicator Interpretation</td><td>Offers a comparison of the consumption of chemical pesticides in a company over time, evaluating their behavior and applying statistics to identify averages and trends, among other measurements. A comparative analysis of averages for consecutive years helps companies make decisions and establish goals to reduce consumption of chemical pesticides.</td></tr>
</table>

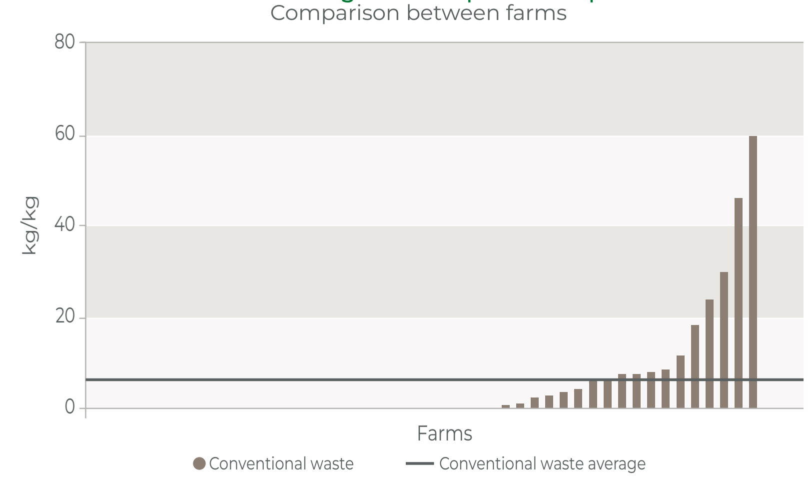
11	Observations	With this indicator, it is possible to identify farms with higher and/or lower values of active ingredient consumption per hectare, as well as establish measures of central tendencies (average, standard deviation, among others) in order to analyze this variable in the sector.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	It can be evaluated comparatively with local or regional climatic and meteorological data, or with data produced using the farms' own weather stations.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	1996.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	Quintero (2009).

7 Material Consumption Indicator (Cm) – N.

1	Name of the Indicator	Material consumption (C_m)
2	Definition	Calculates amount of raw material used in a month in relation to the generation of waste from the production of flowers and ornamental plants.
3	Objective	Make it easier for companies to calculate amount of raw material used, which is directly related to waste generation.
4	Indicator Formula	$C_m = \left(\frac{\sum ct + cp + m + p + pi}{Fp}\right)$
5	Description of Variables	Cm : amount of material used in the production process. ct : quantity of cardboard boxes used (packaging) (kg). cp : amount of wrapping paper and cellophane used (kg). m : amount of wood used (kg).. p : amount of paper used (kg). pi : amount of greenhouse plastic used (kg). Fp : kilograms of flower produced monthly.
6	Unit of measurement	kg of materials used / kg of flowers produced.

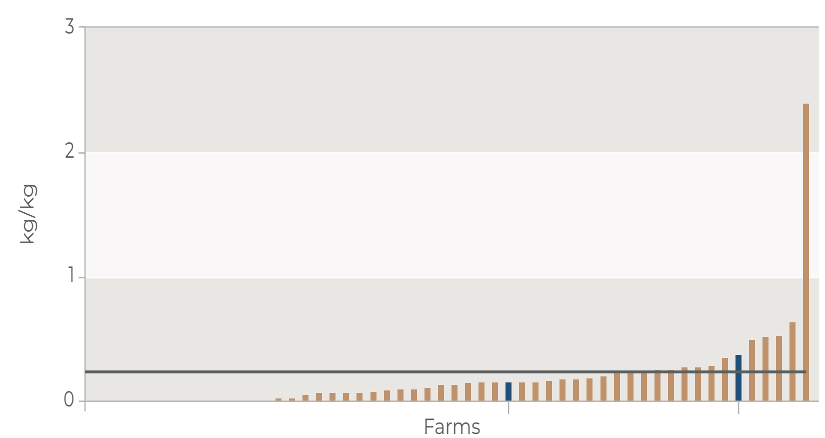
7	Measurement Methods	The amount of material used, mainly in post-harvest (cardboard, wrapping paper, and cellophane) and cultivation (greenhouse plastic and wood) is recorded monthly. Data associated with these amounts is provided by personnel in charge of the warehouse or procurement.
8	Form of Presentation	EThe indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. Quantity of material used per flower produced Comparison between farms  It can also be calculated for one or several farms from the same company for any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator interpretation	Companies with the highest values in terms of use of materials are generally those that generate more of this type of waste in a month. A good understanding of materials used and possible management options once they become conventional waste, make it possible to optimize the use of these materials.
11	Observations	None.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Generated waste.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretary.
15	Year of Elaboration	March 2015.
16	Date of Last Update	August 13, 2020.
17	Secondary Sources	Asocolflores (2002).

8 Generated Waste Indicator (Rg) – N

1	Name of the Indicator	Waste generated (Rg).
2	Definition	Measures amount of solid waste generated monthly for the production of flowers and ornamental plants.
3	Objective	Calculate amount of conventional solid and hazardous waste generated.
4	Fórmula del indicador	$\mathrm{Rg} = \left(\frac{Rc + Rp}{Fp}\right)$ $\mathrm{Rc} = Ch + Cp + C + m + p + pi + Rv$ $\mathrm{Rp} = Eep + Eap + L + p + Cmp + Ea + Au$
5	Description of Variables	Rc : conventional waste; corresponds to amount of waste generated in the production of flowers, such as scrap (Ch), wrapping paper or cellophane (Cp), cardboard (c), wood (m), paper (p), greenhouse plastic (pi), and waste vegetables (Rv) in kg. Rp : hazardous waste; corresponds to amount of hazardous waste generated: pesticide containers and packaging (Eep), PPE and pesticide application equipment (Eap), lighting (l), batteries (p), computers and peripherals (Cp), oil containers or packaging (Ea), and used oils in kg. Fp : flowers produced (kg).
6	Unit of Measurement	Kilograms of waste / Kilograms of flowers produced.
7	Measurement Methods	Amount of conventional and hazardous waste generated in a month, within the framework of flower production. This data is obtained from the warehouse or from delivery referrals for final disposal.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. Amount of waste generated per flower produced Comparison between farms 

8	Form of Presentation	It can also be calculated for one or more farms over any period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	Companies can count on monthly waste generation data broken down for the two types of waste generated (conventional and hazardous), with which they can see the most representative waste generated in the process and develop waste management replacement, reutilization, or exploitation plans.
11	Observations	Conventional waste addressed with this indicator consists of wrapping paper or cellophane, cardboard, vegetable waste, wood, paper, and greenhouse plastic. Hazardous waste addressed with this indicator consists of pesticide containers and packaging material, PPE, and pesticide application equipment, lighting, batteries, computers and peripherals, oil containers and packaging and used oils.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Material consumption.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	March 2015.
16	Date of Last Update	August 13, 2020.
17	Secondary Sources	Asocolflores (2002).

9 Usable waste indicator – N

1	Name of the Indicator	Usable waste (Rr).
2	Definition	Measures monthly amounts of usable solid waste delivered to a third party for use.
3	Objective	Make it easier for companies to calculate amount of usable wrapping paper or cellophane, cardboard and paper, scrap, and greenhouse plastic waste in a given period, which is delivered to a third party to be reused.
4	Indicator Formula	$\mathrm{Rr} = \left(\frac{\sum Rrc + Rrcp + Rrp + Rrpi}{Fp}\right)$
5	Descripción de variables	Rrc : monthly total of usable cardboard waste (packaging) (kg). $Rrcp$: monthly total of usable wrapping paper or cellophane waste (kg). Rrp : monthly total of usable paper waste (kg). $Rrpi$: monthly total of usable greenhouse plastic waste (kg). Fp : kilograms of flowers produced in a month (kg).
6	Unit of Measurement	Kilograms harvested / Kilograms of flower produced.
7	Measurement Methods	Companies must record the monthly amount of usable waste generated; data that is obtained from referrals of delivery of these materials to third parties for their reuse.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. Amount of waste reuse per flower produced Comparison between farms  It can also be calculated for one or more farms over any given period.

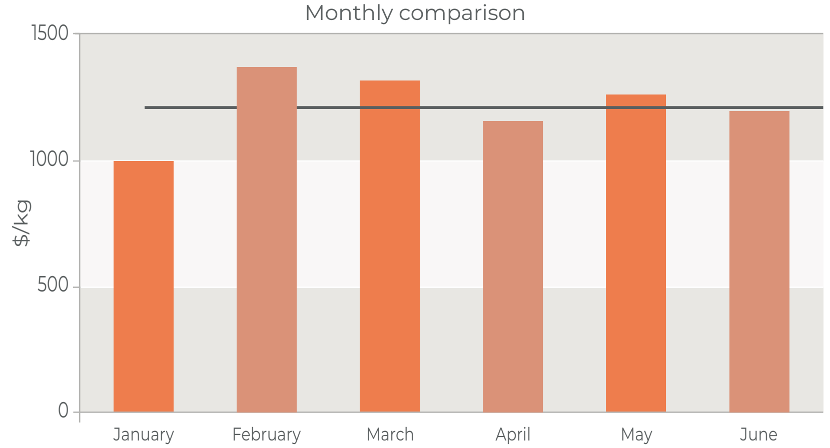
9	**Periodicity in Data Measurement**	Monthly.
10	**Indicator Interpretation**	The aim is to collect information regarding waste used in the floriculture sector and analyze its productivity. With this, companies can compare amounts of waste used in their farms with respect to waste used in other farms of the sector.
11	**Observations**	None.
12	**Sources of Information**	Floriculture companies.
13	**Relationship with Other Indicators**	Consumption of materials and waste generated.
14	**Responsible Entity or Group**	Florverde Sustainable Flowers Technical Secretariat.
15	**Year of Elaboration**	March 2015.
16	**Date of Last Update**	August 13, 2020.
17	**Secondary Sources**	Asocolflores (2002).

Economic indicators

This set of eight indicators allows us to determine the cost of the use of certain fundamental resources in the production of flowers, such as:

a) consumption of pesticides;
b) use of water differentiated by its source, be it surface, underground, or recirculated;
c) the different energy sources used in the process;
d) irrigation water;
e) accidents, and
f) product non-conformity.

10 Pesticide Consumption Cost Indicator (Ccp) – N

1	**Name of the Indicator**	Pesticide consumption cost (Ccp).
2	**Definition**	Calculate cost associated with the use of pesticides, which includes the cost of the pesticides used on the farm and the cost of personnel needed to apply them, for each kilogram of flowers produced.
3	**Objective**	Facilitate the calculation of monthly costs incurred by companies for the use of chemical pesticides.
4	**Indicator Formula**	$Ccp = \left(\frac{Cp + Cmo}{Fp}\right)$
5	**Description of Variables**	Cp : total cost of a pesticide consumed in one month ($). Cmo : monthly cost of labor used to apply pesticides ($). Fp : monthly total kilograms of flowers produced (kg).
6	**Unit of Measurement**	Local currency (Colombian pesos or US dollars) per kilogram of flowers produced (USD/kg).
7	**Measurement Methods**	Each farm has data related to the purchase of chemical products used on the crop month by month. This data is recorded by the warehouse and purchasing area; the company must present updated information on prices of pesticides used throughout the month. On the other hand, the farm must account for the cost of labor associated with the application of chemical products, costs that depend on the type of crop and staff turnover, among others.
8	**Form of Presentation**	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. Cost of pesticide consumption Monthly comparison  It can also be calculated for one or more farms over any given period.

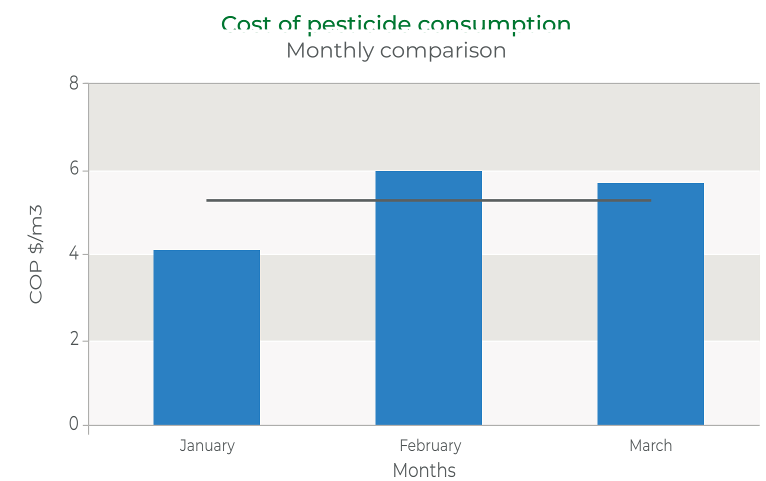
9	**Periodicity in Data Measurement**	Monthly.
10	**Indicator Interpretation**	When comparing the values of the cost of pesticides consumed, it is possible to identify companies that spend more on pesticides, which may be due to methods used to control pests and diseases, the type of crops, the selection of products used, among others.
11	**Observations**	None.
12	**Sources of Information**	Floriculture companies.
13	**Relationship with Other Indicators**	Consumption of active ingredient of chemical pesticides.
14	**Responsible Entity or Group**	Florverde Sustainable Flowers Technical Secretariat.
15	**Year of Elaboration**	May 8, 2018.
16	**Date of Last Update**	August 12, 2020.
17	**Secondary Sources**	ECS Consultants (2016).

11 Accident Cost Indicator $(Cacc)$ – N

1	**Name of the Indicator**	Cost per accident (Cacc).
2	**Definition**	Calculate cost of accidents, disabilities, and occupational diseases suffered by company workers.
3	**Objective**	Evidence expenses incurred by the company for each employee who has an accident in the farm.
4	**Indicator Formula**	$Cae = \left(\frac{Chnl + Cmor + Cr + Cru}{Ne}\right)$
5	**Description of Variables**	Chnl : cost of hours not worked in the month (USD). Cmor : replacement labor costs (USD). Cr : labor retraining costs (USD). Cru : employee relocation costs (USD). Ne : number of employees (#).
6	**Unit of measurement**	Local currency (Colombian pesos or US dollars) per worker (USD/worker)

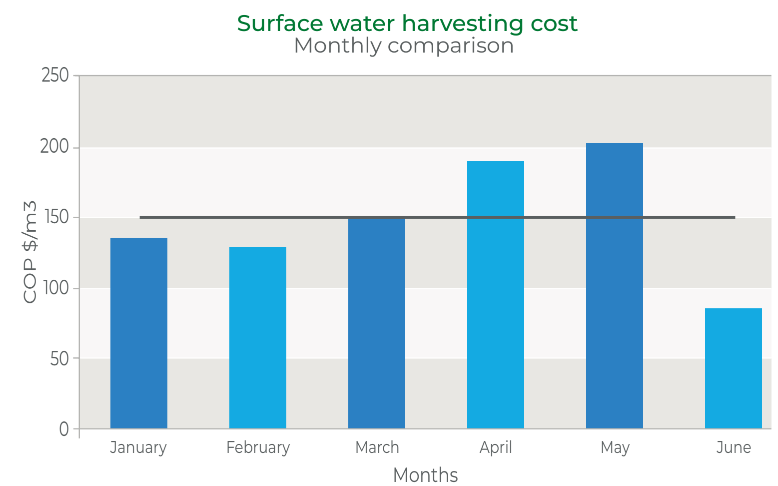
7	**Measurement Methods**	Data for this indicator comes from absenteeism records kept by companies and payments made for disabilities. Additionally, costs of replacement labor and job relocation depend on companies' remuneration policies.
8	**Form of Presentation**	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. It can also be calculated for one or more farms over any given period.
9	**Periodicity in Data Measurement**	Monthly.
10	**Indicator Interpretation**	By comparing data generated by this indicator, an economic follow-up of companies can be made to determine those which have the highest expenses due to accidents. By doing so, those that have accident prevention programs or those whose conditions define a risky environment for their collaborators, are evidenced.
11	**Observations**	With this information, accident prevention programs in floriculture companies can be promoted to protect workers and minimize costs.
12	**Sources of Information**	Floriculture companies.
13	**Relationship with Other Indicators**	Accident rate, severity rate.
14	**Responsible Entity or Group**	Florverde Sustainable Flowers Technical Secretariat.
15	**Year of Elaboration**	May 8, 2018.
16	**Date of Last Update**	August 12, 2020.
17	**Secondary Sources**	ECS Consultants (2016).

12 Groundwater Catchment Cost Indicator – N

1	**Name of the Indicator**	Groundwater catchment cost (Ccas).
2	**Definition**	Calculates monthly cost of collecting groundwater required to produce flowers and ornamental plants.
3	**Objective**	Quantify the cost of capturing groundwater used to produce flowers and ornamental plants in a given period of time.
4	**Indicator Formula**	$Ccas=\left(\frac{Tsb+(Cbasb)}{Vsb}\right)$ $Cbas = (Ceb + Cmr)$
5	**Description of Variables**	Tsb : rate for groundwater use defined by local environmental authority (USD). $Cbasb$: cost of pumping groundwater; corresponds to cost of energy used for groundwater pumping. Ceb : cost of maintenance and spare parts (Cmr) for pump used for this activity (USD). Vsb : total volume of groundwater catchment (m^3).
6	**Unit of Measurement**	Local currency (Colombian pesos or US dollars) per cubic meter of groundwater (USD/m^3).
7	**Measurement Methods**	Groundwater catchment data is obtained from the records of readings of meter installed in the pipe that extracts water from the wells. The volume is measured in m^3. On the other hand, the rate of groundwater use is that which the competent environmental authority charges water resource users. The calculation of pumping energy costs depends on the pump conditions, its maintenance, and the amount of time the pump was used.
8	**Form of Presentation**	The indicator is presented graphically as a histogram of frequencies in which costs of collecting groundwater per company are compared for any given period (monthly or annually). 

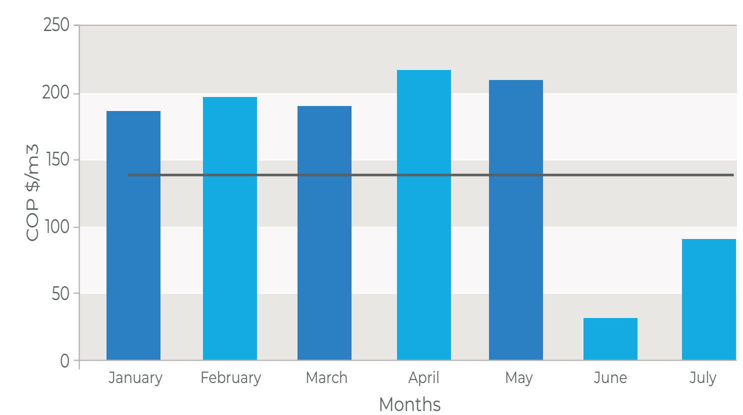
8	Form of Presentation	It also shows comparative graphs of costs of collecting groundwater from one or several farms for any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	When comparing values of the cost of groundwater consumption, it is possible to identify companies with higher costs in terms of groundwater catchment, by highlighting the highest values in the graph. Differences between farms might be due to technical conditions of the well, operational management of the catchment, and the equipment and distribution networks' conditions of each company.
11	Observations	This indicator is complemented by indicators related to the cost of rainwater catchment and cost of collecting water from surface sources, in turn, providing a global idea of costs incurred by the company for the use of different water resources.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Cost of water used for irrigation.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	May 8, 2018.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	■ CAR (2019). ■ ECS Consultants (2016).

13 Surface Water Catchment Cost Indicator – N

1	Name of the Indicator	Surface water catchment cost (Ccasp).
2	Definition	Calculates monthly costs incurred by the company to capture water from surface sources (rivers, lakes, streams, etc.).
3	Objective	Make it easier for the company to calculate costs of capturing water from surface sources, which is used to produce flowers and ornamental plants in each period..
4	Indicator Formula	$Ccasp = \left(\frac{Tas + (Cbas)}{Vas}\right)$ $Cbas = (Ceb + Cmr)$
5	Description of Variables	*Tas* : surface water rates as defined by the local environmental authority (USD). *Cbas* : surface water pumping costs (USD); corresponds to cost of energy used to pump surface water (*Ceb*) (USD) plus the cost of maintenance and spare parts (*Cmr*) (USD) for the pump used for this activity. *Vas* : total volume of surface water catchment (m^3).
6	Unit of measurement	Local currency (Colombian pesos or US dollars) per cubic meter of surface water (USD/m3).
7	Measurement Methods	Surface water abstraction data is taken from meter reading records that quantify volume of water captured; measured in m^3. The calculation of pumping energy costs depends on the pump's conditions, its maintenance and usage time.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which costs of capturing surface water are compared by company during a given period (monthly or annually). 

8	Form of Presentation	It also allows showing comparative graphs of collection costs between farms that record information throughout any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	By comparing values of the cost of surface water consumption, it is possible to identify companies with higher costs in terms of surface water catchment (those with the highest values). The differences between these values might be due to the technical conditions of water catchment, its operational management, or the equipment and distribution networks' conditions of each company.
11	Observations	This indicator is complemented by the indicator for the cost of rainwater catchment, as well as the cost of groundwater catchment, facilitating a global idea of costs incurred by the company in terms of the use of different water resources.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Cost of water used for irrigation.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	May 8, 2018.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	■ CAR (2019). ■ ECS Consultants (2016)

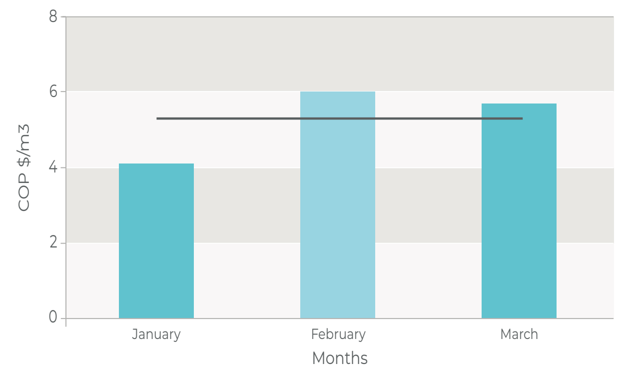
14 Cost of Rainwater Catchment $(Ccall) - \mathrm{N}$

1	Name of the Indicator	Cost of rainwater catchment (Ccall).
2	Definition	Calculate the Company's monthly of catchment of rainwater cost.
3	Objective	Provide the company with the quantification of costs associated with the use of rainwater in the production of flowers and ornamental plants in a given period.
4	Indicator Formula	$Ccall = \left(\frac{Ci + (Cball)}{Vcall}\right)$ $Cball = (Ceb + Cmr)$
5	Description of Variables	Ci : infrastructure cost (USD); corresponds to maintenance costs of the gutters and downspouts (USD) installed in the farm. $Cball$: cost of pumping rainwater (USD); corresponds to energy costs for pumping rainwater (Ceb), plus the cost of maintenance and spare parts (USD) of pump used for this activity (Cmr). $Vcall$: total volume of rainwater catchment (m^3).
6	Unit of Measurement	Local currency (Colombian pesos or US dollars) per cubic meter of rainwater captured (USD/m^3).
7	Measurement Methods	Rainwater catchment data is estimated based on site precipitation, the covered area, as well as the state and type of gutters or channels used. It can also be determined based on the difference between irrigation consumption minus water catchment, the latter having better reliability. The volume of rainwater is measured in m^3.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which costs of using rainwater are compared between different companies during a given period (monthly or annually). Water collection cost Monthly comparison 

8	Form of Presentation	It also facilitates the use of comparative graphs for the costs of using rainwater from one or more farms over any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	When comparing values of the cost of using rainwater in the farms, it is possible to identify those farms with a higher cost in the assembly and maintenance of the rainwater catchment infrastructure. The higher values in consecutive months show the beginnings of the assembly of the catchment infrastructure, or if higher costs are evident in farms that already counted on catchment infrastructure, it might be due to possible failures in its design and assembly.
11	Observations	None.
12	Sources of Information	Precipitation, catchment, and irrigation records that are taken monthly by the companies.
13	Relationship with Other Indicators	This indicator is complemented by indicators of the cost of capturing surface and underground water, facilitating a global idea of costs incurred by the company in terms of the use of different water resources.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	May 8, 2018.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	ECS Consultants (2016).

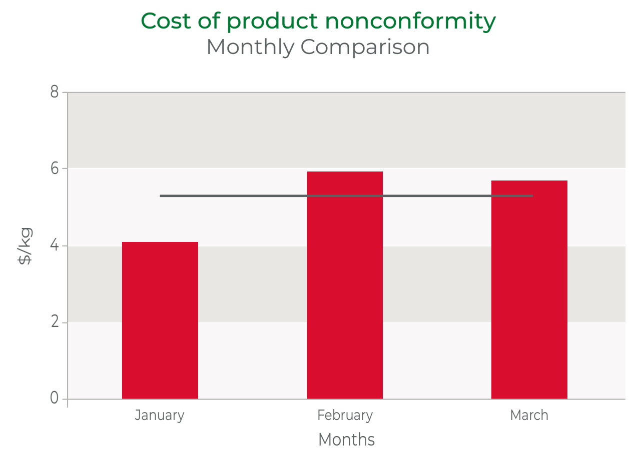
15 Cost of Water Used in Irrigation Indicator (*Car*) – N

1	Name of the Indicator	Cost of water used in irrigation (Car).
2	Definition	Calculate monthly cost incurred by the company for the use of water for irrigation.
3	Objective	Make it easier for the company to quantify monthly costs associated with the use of water that comes from surface, underground, recirculation, and rainwater sources, which is used for irrigation in the farm for production of flowers and ornamental plants.
4	Indicator Formula	$CHr = \left(\frac{Cau + Csr + Cf + Cta}{Vaur}\right)$ $Cau = (Ccasb * \% uasb + Ccasp * \% uasp + Ccall * \%uall) + \left(\frac{Cir + Cbr}{Vaur}\right) (* \% uar)$ $Csr = Ce + Cmr$
5	Description of Variables	Cau : cost of water used (USD). $Ccasb$: groundwater catchment cost (USD). $\%uasb$: percentage of groundwater use (%). $Ccasp$: cost of surface water catchment (USD). $\%uasp$: percentage of surface water use (%). $Ccall$: cost of rainwater catchment (USD). $\%uall$: percentage of rainwater use (%). Cir : recirculation infrastructure costs (USD). Cbr : recirculation pumping cost (USD). $\%uar$: percentage of recirculation water use (%). Var : total volume of water captured for recirculation (m^3). Csr : cost of the irrigation system (USD). Ce : energy cost for operation of the irrigation system (USD). Cmr : cost of maintenance and spare parts for the irrigation system (USD). Cf : cost of fertilizers (USD). Cta : cost of water treatment (USD); corresponds to input costs for water treatment (USD). $Vaur$: total volume of water used in irrigation (m^3).
6	Unit of Measurement	Local currency (Colombian pesos or US dollars) per cubic meter (USD/m^3).
7	Measurement Methods	The data related to water consumption in irrigation is taken from records of meter readings which are installed in the fertigation stations. The volume is measured in m^3.

8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which costs for using irrigation water are compared between different companies during a given period (monthly or annually). Cost of water used in irrigation Monthly comparison  It also facilitates the use of comparative graphs of the irrigation costs of one or several farms over any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	By comparing the values of the cost of irrigation water, it is possible to identify farms that have a higher cost and, possibly, greater use of water resources. The differences between these values can be due to different production methods and operating processes of each farm.
11	Observations	None.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	This indicator depends on the costs of groundwater catchment (Ccas), surface water catchment (Ccasp), rainwater catchment (Ccall), and the cost of recirculating water.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	May 8, 2018.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	ECS Consultants (2016).

16 Product Non-conformity Cost Indicator (Cnc) – N

1	Name of the Indicator	Product non-conformity cost (Cnc).
2	Definition	Calculate monthly cost incurred by the company for product that is classified as discarded, national, and non-exportable.
3	Objective	Make it easier for companies to quantify the cost of product that does not meet exportation quality standards.
4	Indicator Formula	$Cnc = \left(\frac{Ccp + Ccasp + Ccasb + Ccall + Carc + Car + Cee}{Fne}\right)$ $Carc = \left(\frac{Cr + Cbr}{Var}\right)$
5	Description of Variables	Ccp : cost of pesticide consumption (USD/kg). $Ccasp$: cost of surface water catchment (USD/m³). $Ccasb$: cost of groundwater catchment (USD/m³). $Ccall$: cost of rainwater catchment (USD/m³). $Carc$: costo de agua de recirculación que comprende los costos de infraestructura de recirculación (Cr), más el costo de bombeo de recirculación (Cbr) ($), dividido entre el volumen total de captación de agua para recirculación (Var) (m³). Car : cost of water used in irrigation COP/m³). Cee : cost of electrical energy (USD/kg). Fne : kilograms of flower not exported (kg).
6	Unit of Measurement	Local currency (Colombian pesos or US dollars) per kilogram of flower produced, but not exported (USD/kg).
7	Measurement Methods	This indicator depends on registration of data related to catchment of different water sources (underground, surface, rain, etc.), the registration of energy consumption in the process, as well as costs associated with the use of chemical pesticides. This data is managed through the indicator system and iscalculated as independent indicators.

8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared.  It can also be calculated for one or more farms over any period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	Determines the costs that the company assumes for losses of products that are not exported due to operational problems; companies that assume higher costs are those that are having production, quality, or phytosanitary problems. Finally, this indicator is also an input for productivity analysis and monitoring product quality, where variables such as the efficient use of resources, and pest control, among others, have influence.
11	Observations	None.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	This indicator is calculated based on information from the following indicators: pesticide consumption costs, surface water catchment costs, groundwater catchment costs, rainwater catchment costs, and electrical energy costs.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	May 8, 2018.
16	Date of Last Update	August 12, 2020.
17	Secondary Sources	ECS Consultants (2016).

17 Electrical Energy Cost Indicator (Cee) – N

1	Name of the Indicator	Electrical energy cost (Cee).
2	Definition	Quantify the monthly cost of electrical energy required for production activities.
3	Objective	Make it easier for farms to quantify the cost of electrical energy required for flower and ornamental production activities in any given period.
4	Indicator Formula	$Cee = \left(\frac{\left(\left(\frac{Pe + Ci}{Ec} \right) + \left(\frac{Cp}{Ep} \right) \right)}{Fp} \right)$ $Cp = Cc + Cmr$
5	Description of Variables	Pe : Electricity bill from the inter-municipal network (USD). Ci : Infrastructure cost (USD); corresponds to maintenance cost of the electrical network. Cp : Power plant cost (USD); refers to the cost of fuel used (Cc), plus the cost of maintenance and spare parts (Cmr) (USD). Ec : Total energy consumed (kWh); corresponds to total kWh consumed in a month. Ep : Energy produced by the power plant (kWh); corresponds to total kWh produced in a month by the power plant. Fp : Kilograms of flower produced (kg).
6	Unit of measure	Local currency (Colombian pesos or US dollars) per kilogram of flower produced (USD/kg).
7	Measurement Methods	Data associated with the consumption of electrical energy is taken from the billing of this service, where the number of kWh consumed in a month and its cost are identified. Additionally, the company, within the framework of its energy efficiency program, must have a maintenance schedule that includes maintenance of the electrical network and the electrical plant which is used for different tasks in its production process. Regarding the cost of the power plant, costs to be considered only include fuel used for its operation and those associated with its maintenance, which, as explained, can be accounted for by the machinery and equipment maintenance program.

8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that report information each month are compared. It can also be calculated for one or more farms over any given period.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	This indicator shows costs associated with the use of different energy sources in production, in order to help design energy saving plans and implement more efficient processes. Additionally, the indicator lays out the company's situation in terms of its electrical energy use, by comparing it with other companies.
11	Observations	None.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Total energy consumption.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	August 12, 2020.
16	Date of Last Update	August 6, 2018
17	Secondary Sources	ECS Consultants (2016).

Social indicators

This set of seven indicators illustrates the company or farm's performance in aspects such as labor absenteeism due to controllable factors and legal factors, absenteeism due to health issues, as well as accident rates, severity, and turnover. In this sense, priority elements are covered, as well as those that can generate a greater impact on the way the company deals with its collaborators. These indicators are essential to develop prevention programs within companies.

18 Rate of Absenteeism due to Health (LAS) – I

1	**Name of the Indicator**	Rate of absenteeism due to health (LAS).
2	**Definition**	Facilitates measuring absenteeism of workers linked to a company through direct contracts or through third parties (temporary service companies, associated work cooperatives, simplified stock companies), due to causes such as general or occupational illnesses (regardless of their duration) and work accidents. Absenteeism due to health reasons has been organized into the following categories related to medical leave authorized by doctors from health insurance companies (EPS), occupational risk administrators (ARL), or the corresponding entity in the country where the indicator is implemented: - Temporary medical leave due to work-related illness. - Temporary medical leave due to general illness and common accident (includes medical leave due to pregnancy complications). - Temporary medical leave due to a workplace accidents (includes management of accidents and time spent investigating). - Causes related to time spent by workers attending medical appointments. - Time spent by workers attending external medical appointments. - Time spent by workers attending the company's medical appointments (includes accident consultations).
3	**Objective**	Know the main causes of morbidity or accidents that generate the greatest number of cases and days of absenteeism, in order to establish prevention plans or promote health activities. Estimate the number of hours of absenteeism of workers, with the purpose of projecting in advance, the number of monthly work hours to be replaced in production, due to workers' health issues.
4	**Fórmula del indicador**	$I_{as} = (H_a \div H_{pt}) \times 100$
5	**Description of Variables**	Ha : hours of absenteeism that include number of hours of medical leave due to work-related illness, authorized by the ARL (or the corresponding entity) and/or board of workers and subcontractors; number of hours of medical leave due to general illness; number of hours of medical leave due to workplace accidents; number of hours for external medical consultations; number of hours for internal medical consultations. Hpt: hours worked including number of ordinary working hours per week, total number of workers or sub-contractors in the month, number of hours invested in supplementary work by workers or sub-contractors.
6	**Unit of Measurement**	Percentage (%).

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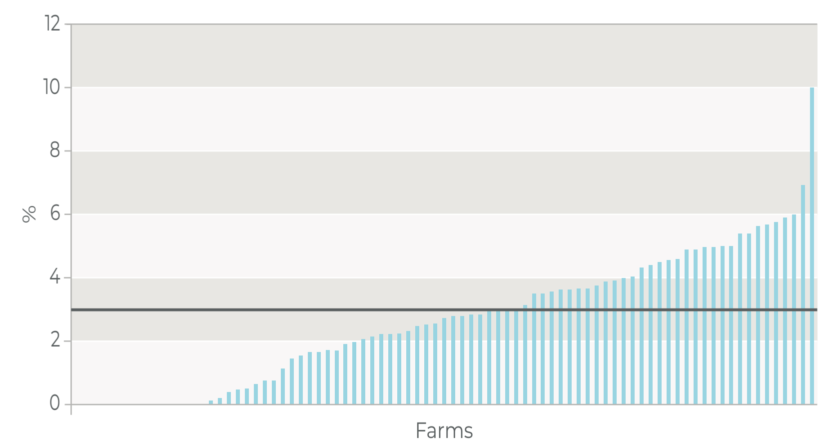
7	**Measurement Methods**	The information comes from:
		
		- Medical leaves authorized by a doctor affiliated to the corresponding social security entities and reported to the company by the worker. Classified according to the origin, medical leave issued for: occupational illness, general illness, and common accident.
		- Time loss caused by permits granted to workers to attend:
		  ○ Medical appointments from corresponding social security entities, monthly statistics, or reports of medical appointments by the company and external doctors.
		  ○ Permission to manage the accident and hours dedicated to the investigation.
		
		The rate of absenteeism due to health problems is generally expressed as a percentage, illustrating the proportion of time lost in the period that is being analyzed.
		
		Indirect measurement methods are used, given that the company must calculate the number of hours not worked in a given period.

8	**Form of Presentation**	The indicator is presented as a bar graph, where the percentage of hours lost can be evaluated, according to information registered by the company. Percentage of absenteeism due to health problems Comparison between farms  It is possible to visualize the percentage registered by the company in terms of years,and compare with other companies in the sector.
9	**Periodicity in Data Measurement**	Monthly.

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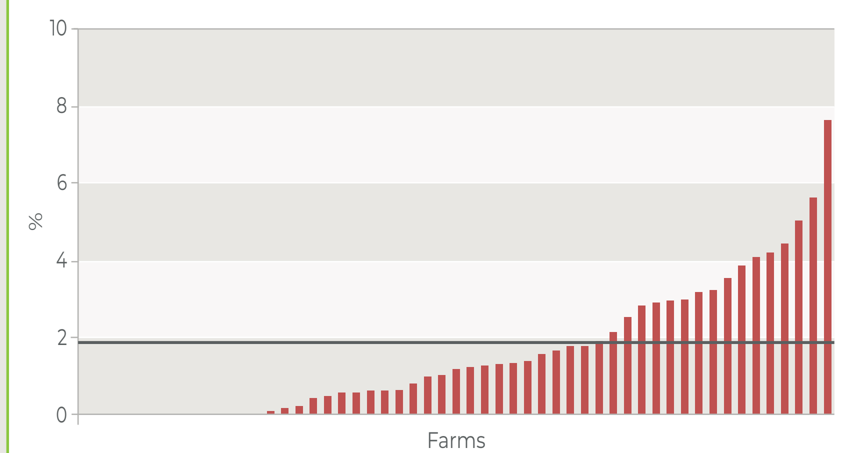
10	Indicator Interpretation	Facilitates monthly information about time lost, or for the period being analyzed, compared to the total number of hours scheduled for all workers during the same period. This percentage is equivalent tothe number of days lost due to absenteeism, taking into account the company's working hours, and is associated with medical leaves due to workers' health issues. Its reading is as follows: absenteeism rate indicates the percentage of time not worked due to workers' medical leave, in relation to expected or planned volume of activity. The company can use this information to calculate cost or extra costs generated by medical leaves. Based on the results, the company can take measures to define absenteeism policies, real time worked, evaluation of prevention and health promotion programs, among others. The characterization of this, according to the origins of different health complications, allows companies to identify the main causes of absenteeism, and consequently, human resources will be able to make decisions or propose actions or programs to help reduce this phenomenon among workers. Among the benefits are: ▪ Definition of goals to reduce days lost due to temporary medical leave. ▪ Have information to verify the main causes of medical absenteeism and the diagnoses associated with the medical leave, so that annual work plans and activities can focus on the prevention and promotion of workers' health. ▪ When results are analyzed taking into account variables such as time, person responsible, and place, they become management tools, allowing a permanently updated diagnosis of the situation, making decisions, and verifying whether or not they were correct. ▪ Calculate the resetting of real working time, according to scheduled production in a specific period, identifying areas or processes of the organization in which there are higher numbers of absenteeism due to medical leaves. ▪ Identify absenteeism peaks according to periods evaluated. ▪ Define number of personnel to hire for peak production times. ▪ Calculate cost overruns for this item.
11	Observations	With this measurement, the main causes of medical leave can be evaluated according to the origin (common or workplace) and compared with the three main causes of medical leave in the floriculture sector in recent years, which are related to musculoskeletal, respiratory, and digestive system problems.

12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Accident rate, severity rate.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.
17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with support of the Directorate of Sustainability and Environmental Affairs' technical team.

19 Absenteeism due to Labor Factors according to the Law (Ial) – CA

1	Name of the Indicator	Absenteeism due to labor factors according to the law (Ial).
2	Definition	The International Labor Organization (ILO) defines labor absenteeism as "non-attendance by an employee, who was considered to be attending, excluding vacation periods and strikes". This indicator makes it possible to measure non-working time of workers linked to a company, through direct hiring, or through third parties (temporary service companies, associated work cooperatives, simplified stock companies), due to leaves and permits established by labor legislation of the country where the indicator is implemented. Absenteeism due to legal factors includes all those permits that are regulated by the legislation of the country where the indicator is implemented and are considered mandatory for employers.

2	**Definition**	Causes related to maternity protection: ■ Maternity leave (art. 236 of the Substantive Labor Code –CST–, or the equivalent policy document in the country). ■ Paternity leave (art. 236 paragraph 2 of the CST or the equivalent policy document in the country). ■ Breastfeeding permission (art. 238 of the CST or the equivalent policy document in the country). ■ Includes medical appointments related to maternity or disabilities, abortion leave, delivery preparation permits (prophylactic). Causes related to permits, leaves, and absences. ■ Bereavement leave (art. 57 number 10 of the CST or the equivalent policy document in the country). ■ Funeral of companions leave (art. 57 numeral 6 of the CST or the equivalent policy document in the country). ■ License due to performance of official positions –election jurors– (art. 57, numeral 6 of the CST or the equivalent policy document in the country). ■ License to exercise the right to vote (art. 57, numeral 6 of the CST and Law 403/1997 art. 3 or the equivalent policy document in the country). Causes related to worker participation in union or conventional activities. ■ Workers' union permits (art. 57, numeral 6 of the CST or the equivalent policy document in the country).
3	**Objectives**	■ Identify legal permits that generate the highest percentage of hours lost due to absenteeism. ■ Establish, individually and in different analysis groups, the impact of these regulations on the competitiveness of companies and/or the sector. ■ Establish measures to reduce the impact of absenteeism on the company's productivity. ■ Show compliance of companies and the sector with regulations and policies in force in the country where the indicator is implemented.
4	**Indicator Formula**	$I_{al} = (H_a \div H_{pt}) \times 100$
5	**Description of Variables**	The formula is defined by capturing the following information: Ha : number of hours accumulated for maternity protection in directly hired and third-party workers; number of hours accumulated for paternity in directly hired and third party workers; number of hours accumulated for breastfeeding in directly hired and third party workers; number of hours paid for permits contemplated by law by directly hired and third party workers; number of unpaid hours for permits contemplated by law by directly hired and third party workers; number of hours accumulated for union absences for directly hired and third party workers. Hpt: number of ordinary weekly working hours for directly hired and third-party workers; total number of directly hired and third-party workers in a month; number of hours invested in supplementary work carried out by directly hired and third-party workers.

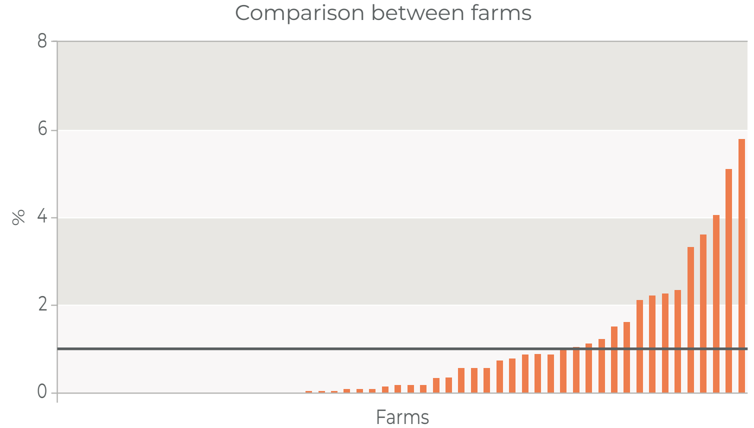
6	**Unit of Measurement**	Percentage (%).
7	**Measurement Methods**	Social indicators are mathematical formulations that aim to analyze a specific situation of the working population within companies. The indicator of absenteeism related to legal clauses reflects the percentage of time lost in each period.. Indirect measurement methods are used, since the company must calculate the number of hours not worked due to the different causes in each period, taking into account the following typified causes: ■ Maternity leave: paid leave granted by law, which is offered to the mother at the time of childbirth or abortion. ■ Paternity leave: paid leave granted by law, which is offered to the spouse or permanent partner exclusively at the time of birth. ■ Breastfeeding: paid break granted by law, which is offered to mothers during the breastfeeding period. ■ Remunerated according to the law: all permits, or leaves granted by law, or approved by the company's directives, and which are enjoyed by the worker without being deducted from his/her salary, as long as the respective paper work is presented. ■ Unions: time agreed with unionized workers related to the operation of the board of directors and the different commissions.
8	**Form of Presentation**	The indicator is presented graphically as a histogram of frequencies in which farms that reported monthly information are compared, and each company can visualize its monthly or yearly performance as a percentage. Absenteeism rate granted by law Comparison between farms 
9	**Periodicity in Data Measurement**	Monthly.

10	Indicator Interpretation	The result provides information about time lost in a given period, compared to the total number of hours scheduled for all workers during that same period. This figure, in percentage terms, is equivalent to the number hours of absenteeism within the company's working day. Its reading is as follows: percentage of time lost in a month due to work absenteeism (permissions, leaves and suspension of workers, etc.), in relation to the scheduled work time. This indicator allows the company to calculate the cost or cost overruns generated by absenteeism due to work-related issues, and, based on the results, the company can take the necessary measures about absenteeism policies, real time worked, evaluation of hiring strategies, administration of human talent, training, welfare, and work environment. The benefitsof this indicator are the following: ■ Implement selection, hiring, and training policies to reduce the percentage of absenteeism. ■ Identify peaks according to labor demand during the company's high season. ■ Maintain a permanently updated diagnosis of the situation, make decisions, and verify if they were correct, once results are analyzed in relation to variables of time, persons, and place. ■ Calculate the replacement of real time to work, according to scheduled production in each period.
11	Observations	**Inclusion criteria** Because of the different modalities of contracting workers in the sector and in accordance with the applicable legal framework, it is pertinent to include in the analysis the hours worked and absenteeism of directly hired personnel and those contracted via third parties (temporary service companies, associated work cooperatives, associated work organizations, and simplified stock companies), which work in the production process. This helps to obtain data with greater precision and reliability to monitor the Company's productivity. The foregoing does not mean that the legal nature and principles of autonomy and administrative self-management of the aforementioned third parties are disregarded. Therefore, the absenteeism indicator is differentiated according to the type of contract: absenteeism of directly hired workers, depending on the different modalities (indefinite term contract, fixed term contract, contract for a specific project or job) and absenteeism of workers hired through third parties (temporary service companies, associated work cooperatives, associated work organizations, and simplified stock companies).

11	Observaciones	**Exclusion criteria** The following are not included in the number of absenteeism hours: ■ Absences where the worker has to make-up the time on a later date, when permitted by the law. ■ Vacation leave. ■ Internal training carried out within working hours . ■ Time affected by strikes..
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	■ Total absenteeism. ■ Accident rate and severity rate for work accidents.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.
17	Secondary Sources	Responsibility Team and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directora-te of Sustainability and Environmental Affairs' technical team.

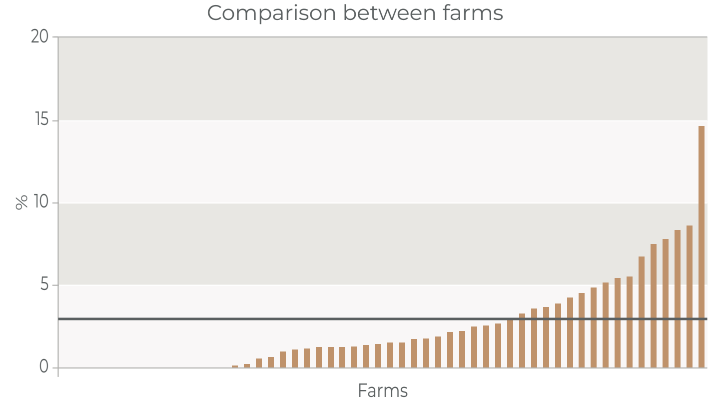
20 Absenteeism due to Controllable Labor Factors (*Iafc*) – CA

1	Name of the Indicator	Absenteeism due to controllable labor factors (Iafc).
2	Definition	Percentage of hours lost in the evaluated period (month/year) due to controllable absenteeism. This indicator allows companies to measure non-working time of workers hired directly or through third parties (temporary service companies, associated work cooperatives, simplified stock companies), for paid and unpaid leaves, or sanctions which result from the free will of the employer, according to causality.
3	Objectives	■ Identify absenteeism that can be controlled by the company and generates the highest percentage of hours lost. ■ Establish parameters to define the time to grant for each controllable absenteeism, according to time requested by directly hired workers and those hired through third parties, in turn, reducing the impact on the company's operations.

4	Indicator Formula	$I_{afc} = H_a \div H_{pt} \times 100$
5	Description of Variables	Ha : number of hours paid for leave granted by the company for its directly hired workers and those hired through third parties; number of unpaid hours for leaves granted by the company for its directly hired workers and those hired through third parties; number of hours deducted due to sanctions on directly hired workers and those hired through third parties. Hpt : number of hours in an ordinary working week for directly hired workers and those hired through third parties; total number of directly hired workers and workers hired through third parties in a month; number of hours invested in supplementary work carried out by directly hired workers and workers hired via third parties.
6	Unit of Measurement	Percentage (%).
7	Measurement Methods	The controllable absenteeism indicator gives us the percentage of time lost due to sanctions or leaves granted to directly hired workers or workers hired through third parties, in any given period. It uses indirect measurement methods, given that the company must calculate the number of hours not worked due to different causes in a given period, taking into account the following typified causes: ■ Paid leave: absenteeism authorization granted to directly hired workers or workers hired through third parties, for an agreed period, without affecting worker's salary. ■ Unpaid leave: absenteeism authorization granted to directly hired workers or those hired through third parties, for an agreed period, but deducting the time from the worker's salary. ■ Sanctions: disciplinary sanctions allow the employer to correct workers' misconduct, such as not showing up to work or not fulfilling work obligations, in line with the company's regulations or processes and procedures.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared. Absenteeism rate due to controllable labor factors Comparison between farms  The company can know its monthly or yearly performance percentages.

9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	With the results of the indicator, the measurement of monthly or yearly time lost due to controllable absenteeism can be obtained, and the company can even compare its results with those of other companies in the sector or the group of certified companies. The control that each company can have is the visualization of total hours scheduled versus percentage of hours lost due to these causes. This figure, shown as a percentage, is equivalent to hours of absenteeism within the company's working day for the concepts of controllable absenteeism. Its reading is as follows: percentage of time lost in a month due to controllable absenteeism, in relation to scheduled work time. The company can calculate the cost generated by controllable absenteeism and based on the results, take the necessary measures regarding this absenteeism policy, evaluating the amount of leaves to grant, depending on the request of directly hired workers or those hired through third parties, and thus define sanctions according to the severity of the misconduct carried out by the directly hired worker.
11	Observations	
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	■ Total absenteeism. ■ Accident rate and severity rate of work accidents.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.
17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directorate of Sustainability and Environmental Affairs' technical team.

21 Absenteeism due to Labor Factors (IAL) – I

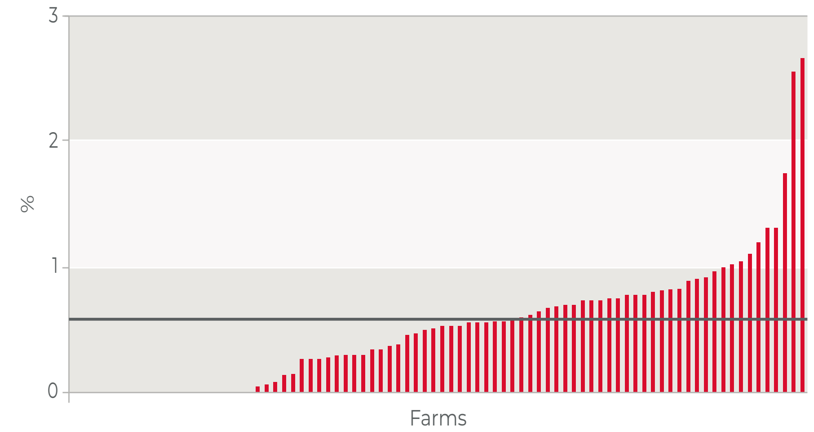
1	Name of the Indicator	Absenteeism due to labor factors (IAL).
2	Definition	This indicator refers to the total amount of absenteeism due to legal and/or controllable factors presented by directly hired workers and those hired through third parties, in a defined period of time. Therefore, the percentage of hours lost due to absenteeism in the company is identified.
3	Objectives	▪ Know the total percentage of the company's administrative absenteeism of directly hired workers and those hired through third parties. ▪ Establish control and management measures for total absenteeism. ▪ Identify time lost by directly hired workers and workers hired through third parties with respect to scheduled work time.
4	Indicator Formula	$Ta = AC_i \div Ti \times K$
5	Description of Variables	Ial : rate of absenteeism due to legal factors (see indicator 19).. $Iafc$: rate of absenteeism due to controllable factors (see indicator 20).
6	Unit of measurement	Percentage (%).
7	Measurement Methods	For this indicator, calculations of absenteeism rate due to legal factors and absenteeism rate due to controllable factors are taken into account. This measurement serves to know the total administrative absenteeism.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared. Percentage of absenteeism due to labor factors Comparison between farms  The company can know its monthly or yearly performance as a percentage.

9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	This indicator shows the total time lost due to administrative absenteeism of directly hired workers, with monthly and annual periodicity, and it also facilitates a comparison between companies, as a percentage. The reading is as follows: percentage of time lost in a month due to administrative absenteeism, in relation to scheduled work time.
11	Observations	
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	▪ Absenteeism due to legal factors. ▪ Absenteeism due to controllable factors. ▪ Accident rate and severity rate for work accidents.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.
17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directorate of Sustainability and Environmental Affairs' technical team.

22 Accident Rate (TA) – I

1	Name of the Indicator	Accident rate (TA).
2	Definition	Indicates the number of accidents occurred and accepted by the ARL or the corresponding entity in the country where the indicator is implemented, during a given period. By multiplying this result by one hundred, the number of accidents that occur for every one hundred exposed workers during each period of time is obtained.

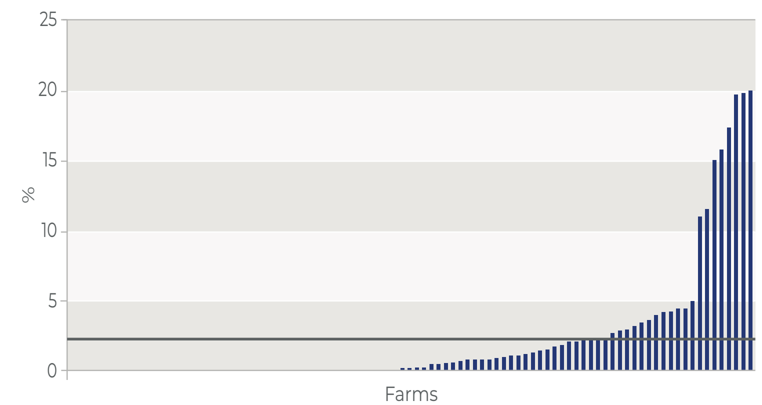
3	Objectives	■ Establish a level of measurement that serves as reference for the number of cases of workers who have reported work accidents. ■ Allow companies of different sizes to compare themselves with others, whether in the same sector or not, both nationally and internationally. ■ Support decision-making for actions that must be developed in order to control or prevent the causes of accidents in the company. ■ Assess the level of performance and effectiveness of the company's health and safety programs.
4	Indicator Formula	$Ta = AC_i \div Ti \times K$
5	Description of Variables	ACi: number of work accidents in period i, which corresponds to: number of accidents without disability occurring to directly hired workers + number of accidents with disability occurring to directly hired workers + number of accidents without disability occurring to workers hired through third parties + number of accidents with disability foro workers hired through third parties. Ti : total number of exposed workers, in period i, which corresponds to: number of directly hired workers who worked the entire month + number of workers hired through third parties who worked the whole month + number of days worked by directly hired workers who left the company during the reported period + number of days worked by workers hired through third parties who left the company in the reported period + number of days worked by directly hired workers who joined the company in the reported period + number of days worked by workers hired through third parties who joined the company in the reported period. K : 100.
6	Unit of measurement	Percentage (%).
7	Measurement Methods	The company must record the number of work accidents presented during the month and reported to the ARL, or corresponding entity, as well as the number of workers who were exposed to accidents during the same month.

8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared. This shows the consolidated percentage behavior of the accident rate. Accident rate Comparison between farms  This percentage can be viewed by company, by years, by months, or as a comparison between companies.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	The calculated data corresponds to percentage of people injured in the company, for every one hundred workers, who were exposed during a certain period.
11	Observations	An event or accident is understood to be any injury suffered by a worker due to their work. Some companies in the floriculture sector exclude minor injuries from the accident report sheet; for example, workers pricked by rose thorns, which do not require consultation with a doctor. The accumulated yearly accident rate corresponds to the sum of values obtained for all months (month-to-month rate) in the year or period of time analyzed
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	■ Severity rate: when related to this indicator, a company can visualize the seriousness of accidents that have occurred in the company. ■ Percentage of absenteeism due to health issues.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.

17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directorate of Sustainability and Environmental Affairs technical team.

23 Severity Rate of Work Accidents (TS) – I

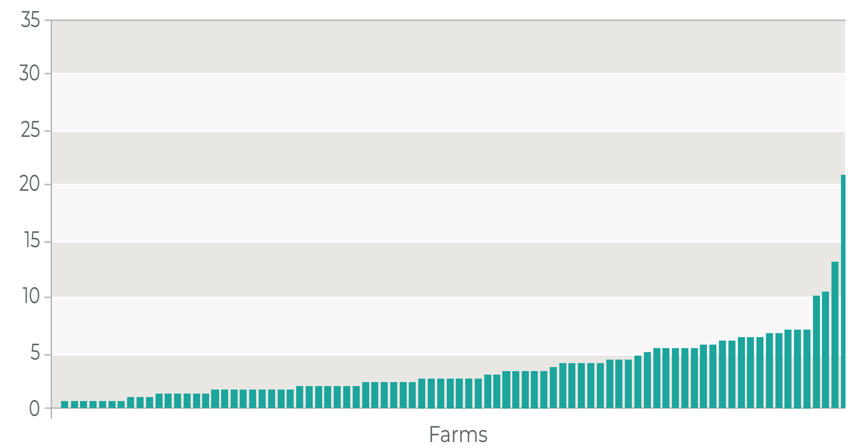
1	Name of the Indicator	Severity rate of work accidents (TS).
2	Definition	Shows ratio of the average number of days lost for each injured worker.
3	Objectives	■ Assess the level of severity of work accidents; the greater amount of time lost, the more severe accidents are said to be. ■ Support goals or actions to be taken to reduce the severity of accidents occurring in the different tasks or areas of the company. ■ Assess the level of performance and effectiveness of the company's occupational health programs.
4	Indicator Formula	$T_s = \frac{D_{pi}}{T_i}$
5	Description of Variables	Dpi : number of days lost due to work accidents during period i. Ti : total number of injured workers during period i.
6	Unit of Measurement	Percentage (%).
7	Measurement Methods	The company must record the number of days not worked by workers due to work accidents occurring during the month, as well as the number of workers injured in the same month, based on reports made by the ARL, or corresponding entity. **Reported data:** ■ Total number of days lost due to work accidents. ■ Number of accidents without medical leave for directly hired workers. ■ Number of accidents without medical leave for workers hired through third parties. ■ Number of accidents with medical leave for directly hired workers. ■ Number of accidents with medical leave for workers hired through third parties.

8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared. This shows the consolidated percentage behavior of the severity rate. Severity rate Compararison between farms  This percentage can be viewed by company, by years, months, or as a comparison between companies in the sector.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	The severity rate shows the percentage of time lost due to work accidents occurring in directly hired workers and those hired through third parties. The severity indicates the seriousness of accidents occurred in a certain period of time; the higher the values, the higher the need for a company to take measures to minimize the impact of accidents among its workers.
11	Observations	Severity can be classified into: ■ Accidents without medical leave. ■ Minor accidents: those that require up to 15 days of medical leave for recovery. ■ Severe accidents: are those that require more than 15 days of medical leave.
12	Sources of Information	Floriculture companies.

13	Relationship with Other Indicators	■ Accident rate. ■ Rate of absenteeism due to occupational health accidents.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October 2019.
17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directorate of Sustainability and Environmental Affairs technical team.

24 Turnover Percentage (R) – N

1	Name of the Indicator	Turnover percentage (R).
2	Definition	This indicator shows the relationship that exists between the number of workers who begin and stop working for a company during a period of time, compared to total average number of workers during the same period. Directly hired workers include those with fixed term contracts, indefinite term contracts, and contracts for specific jobs. Workers hired through third parties include temporary workers (temporary service companies), third-party cooperatives, and independent contractors.
3	Objectives	■ Measure the percentage of employee turnover, and thus, verify stability. ■ Verify the effectiveness of processes, including those of selection, hiring, loyalty, and workers' monitoring.
4	ndicator Formula	$R = \frac{(Tim + Trm)}{(Pim + Pfm)} \times 100$
5	Description of Variables	Tim : total monthly new workers - corresponds to the number of people who started working for the company on that month. Trm : total monthly withdrawals - corresponds to the number of people who stop working for the company on that month. Pim : staff the beginning of the month - corresponds to the number of people who were working for the company at the beginning of the month. Pfm : staff at end of month - corresponds to the number of people who were working for the company at the end of the month.

6	Unit of Measure	Percentage (%).
7	Measurement Methods	The company must record the number of people who worked during the month and the number that stopped working, according to variables described in item 5 of this methodological sheet.
8	Form of Presentation	The indicator is presented graphically as a histogram of frequencies in which farms that reported information each month are compared. This shows the consolidated percentage behavior of the turnover rate. Rotation rate Comparison between farms  This percentage can be viewed by company, by years, months, or as a comparison between companies in the sector.
9	Periodicity in Data Measurement	Monthly.
10	Indicator Interpretation	High values indicate a higher turnover of personnel in the company, while low values infer a lower turnover, that is, greater stability for workers in the company; this can be validated by month and by year. The result means that compared to the total average number of workers (directly hired and those hired through third parties) in a month, this figure, in percentage terms, is equivalent to workers (directly hired and/or hired through third parties) who started and stopped working for the company. This percentage shows what is missing in order to have 100% of the personnel. Accumulated turnover refers to the percentage of people who started and stopped working for the company compared to the total number of workers (total, directly hired, and those hired through third parties) that are accumulated monthly. The indices of people who started and stopped working for a company refer to movements of personnel for these concepts, compared to the total number of workers (total, directly hired, and those hired through third parties). Staff turnover is very costly for the organization, not only because it alters normal operations (additional workloads, change of functions, recruitment costs, effects on the work environment, security, etc.), but also because of the time and costs involved in the recruitment, selection, and training of new personnel, either hired directly or through third parties.

11	Observations	Among the benefits of this indicator are: ■ Measure the effectiveness of the selection and induction processes. ■ Define selection, hiring, and induction policies and parameters. ■ Evaluate causes of personnel rotation (internal/external) in order to define policies and procedures for the selection process, and strengthen programs aimed to improve staff stability, the work environment, the sense of belonging, and the employer's brand. ■ Create the need to implement feedback processes or interviews to establish the true causes for workers leaving the company. ■ Establish costs associated with personnel turnover. ■ Determine the total number of workers required by the company, taking into consideration turnover percentages.. ■ Identify when staff turnover is higher than the sector's average, and does not correspond to seasonal turnover. ■ Show the rotation behavior in the analysis group.
12	Sources of Information	Floriculture companies.
13	Relationship with Other Indicators	Absenteeism due to controllable factors, absenteeism due to health issues, absenteeism due to legal factors, and total absenteeism.
14	Responsible Entity or Group	Florverde Sustainable Flowers Technical Secretariat.
15	Year of Elaboration	December 28, 2010.
16	Date of Last Update	October, 2019.
17	Secondary Sources	Responsibility Team, and Social Responsibility and Occupational Health Committee of Asocolflores, with the support of the Directorate of Sustainability and Environmental Affairs technical team.

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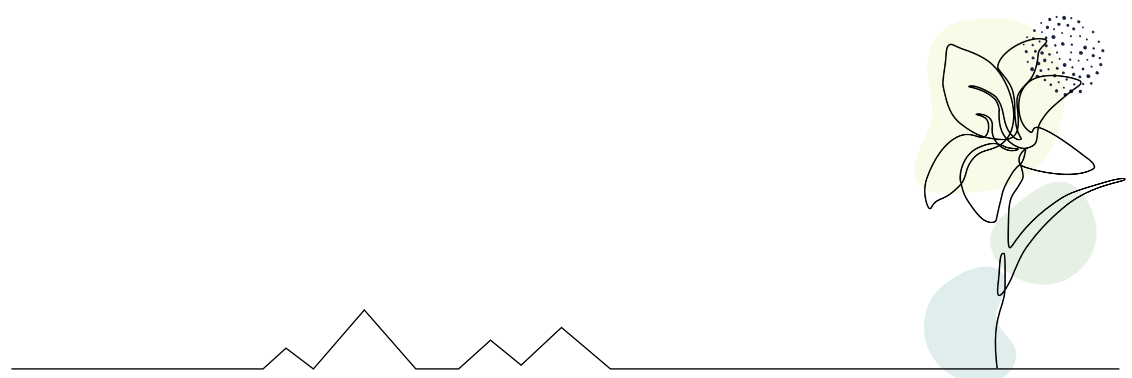

Attachment 1. **Directory of Resources**

Often, companies need to go one step further with the data they manage for indicators; they might want to ask questions, integrating new data that responds to each company's specific needs, or simply understand how indicators were calculated by using a simple tool such as Microsoft Excel. For this reason, we have incorporated a directory of digital resources, including videos and instructions, to help carry out simple processes using the data that has generated the indicators presented in this document, using spreadsheets.

Development of Pivot Tables

Pivot tables are a powerful tool for manipulating data in tabular form, given that they allow automatic data summaries and the application of multiple filters with great versatility, especially when the table containing the original data is too large or complex.

To create a pivot table, follow instructions provided in the video at the following link: https://support.microsoft.com/es-es/office/crear-una-table-dyn%C3%A1mica-para-analyze-data-from-a-sheet-of-c%C3%A1lculo-a9a84538-bfe9- 40a9-a8e9-f99134456576?wt.mc_id=otc_excel

Or carry out the following exercise: "Create a pivot table for the first time": https://omextemplates.content.office.net/support/templates/en-us/tf16400647.xltx

Developing Graphs with One Variable

Graphs help the audience visualize data more effectively.
The following link illustrates how to create a chart and add a trend line.
https://support.microsoft.com/es-es/office/crear-un-gr%C3%A1fico-de-principo-a-fin-0baf399e-dd61-4e18-8a73-b3fd5d5680c2?wt.mc_id=otc_excel

General Information about Formulas in Excel

The following link introduces the creation of formulas and using built-in functions to perform calculations and solve problems:
https://support.microsoft.com/es-es/office/informaci%C3%B3n-general-sobre-f%C3%B3rmulas-en-excel-ecfdc708-9162-49e8-b993-c311f47ca173?wt.mc_id= otc_excel

Introduction tutorial to formulas in Excel:
https://templates.office.com/es-es/tutorial-de-f%c3%b3rmula-tm16400656

Using the Average

The average of a finite set of data is equal to the sum of all its values, divided by the number of summands. Microsoft Excel has a tool that allows you to easily calculate averages. To add the average to the constructed table and graph, you need to place the cursor in the cell immediately below the one that contains the data in your table. Next, click on the Excel function bar, on the "Insert function" button, and then, select the "Average" function and click on "OK" again.

To learn more, click on the following link:
https://support.microsoft.com/es-es/office/promedio-funci%C3%B3n-promedio-047bac88-d466-426c-a32b-8f33eb960cf6

Trend Analysis

One of the methods used to evaluate the trend of data in a graph is to carry out a linear regression on it. To do this, simply place the mouse pointer over one of the bars of the graph that represents the variable of interest and right click to select the option "Add trend line".

To learn more, click on the following links:
https://support.microsoft.com/es-es/office/tendencia-funci%C3%B3n-tendencia-e2f135f0-8827-4096-9873-9a7cf7b51ef1
https://support.microsoft.com/es-es/office/agregar-una-l%C3%ADnea-promedio-m%C3%B-3vil-o-de-tendencia-a-un-gr%C3% A1fico-fa59f86c-5852-4b68-a6d4-901a745842ad
https://en.wikihow.com/do-an-an%C3%TrendAnalysis-in-Excel

Using the Standard Deviation

The standard deviation of a set of data reflects its variability with respect to the average, expressed in the same units of the variable. It provides information about how far individual data points tend to stray from the average.

To learn more, click on the following links:
https://support.microsoft.com/es-es/office/desvesta-funci%C3%B3n-desvesta-5ff38888-7ea5-48de-9a6d-11ed73b29e9d
https://es.wikihow.com/calcular-la-deviaci%C3%B3n-est%C3%A1ndar-in-Excel