

Citricultor

Fundecitrus
SCIENCE AND SUSTAINABILITY
IN CITRICULTURE

Care for the grove, respect for the environment

FARM IN THE SÃO PAULO COUNTRYSIDE
COMBINES HIGH YIELD WITH CONSERVATION
OF NATURAL RESOURCES, CONTRIBUTING
TO A GOOD RATIO BETWEEN PRODUCTION
AND PRESERVATION CHARACTERISTIC OF
THE BRAZILIAN CITRUS BELT

Citricultor

CITRICULTOR magazine is a free publication edited by the Fundo de Defesa da Citricultura - Fundecitrus. Fundecitrus, a world reference in science for citriculture, is a non-profit private institution established in 1977 and maintained by citrus growers and processors in the state of São Paulo, Brazil, to foster the sustainable development of the Brazilian citrus belt.

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FUNDECITRUS



2020-2021 CROP

First forecast update points to a production of 286.72 million boxes



INTERVIEW

Engineer Jacques Benchetrit reminisces about the history of setting up the first large orange juice processing plant in Brazil

MARIA CLARA EPIFANIA



SUSTAINABILITY

Citrus grower in São Paulo combines high yield with care for natural resources

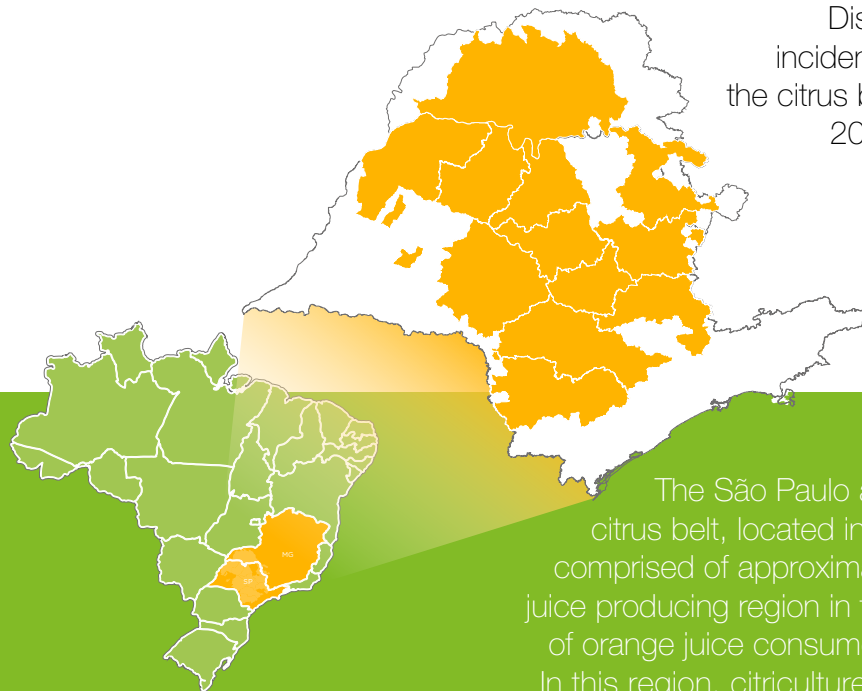
GREENING

Disease incidence in the citrus belt is 20.87%



BRAZILIAN CITRUS BELT

The São Paulo and West-Southwest Minas Gerais citrus belt, located in the Southeast region of Brazil and comprised of approximately 350 cities, is the main orange juice producing region in the planet: three out of five glasses of orange juice consumed in the world are produced here. In this region, citriculture creates 200 thousand direct and indirect jobs and collects 189 million dollars in taxes.



Updated 2020-2021 orange crop forecast totals 286.72 million boxes

FIGURE IS 0.36% SMALLER THAN THE INITIAL FORECAST OF MAY

The first 2020-2021 orange crop forecast update for the São Paulo and West-Southwest Minas Gerais citrus belt, published in September by Fundecitrus is 286.72 million boxes of 40.8 kg each. This figure is 0.36% smaller than the May 2020 forecast and 25.87% smaller in comparison to the previous crop, which represents one of the most severe crop losses in the last ten years. Approximately 20.54 million boxes of the estimated crop are expected to be produced in the Triângulo Mineiro.

RAINFALL REGIME AND FRUIT GROWTH

The average weight of early oranges was higher than originally estimated due to rains that fell from May to June, just before harvest. According to data from Somar Meteorologia, the accumulated rainfall varied among regions, with higher amounts closer to the southwest sector of the citrus planted area.

The accumulated rainfall was

150 to 200 millimeters in the regions of Itapetininga, Avaré and Duartina; 55 to 80 millimeters in Porto Ferreira, Limeira, Brotas, São José do Rio Preto and Matão; 30 to 50 millimeters in Votuporanga, Bebedouro and Altinópolis; and slightly above 20 millimeters in the Triângulo Mineiro. In the part of the citrus belt located in Minas Gerais, the use of irrigation helped overcome the lower rainfall in approximately 80% of the area.

In July, a drought affected the whole citrus belt and the accumu-

lated rainfall for the month was below 10 millimeters on average in all regions. Days remained hot and dry in August, except for three regions where rainfall was considerable: Itapetininga (140 millimeters), Duartina (108 millimeters) and Avaré (93 millimeters).

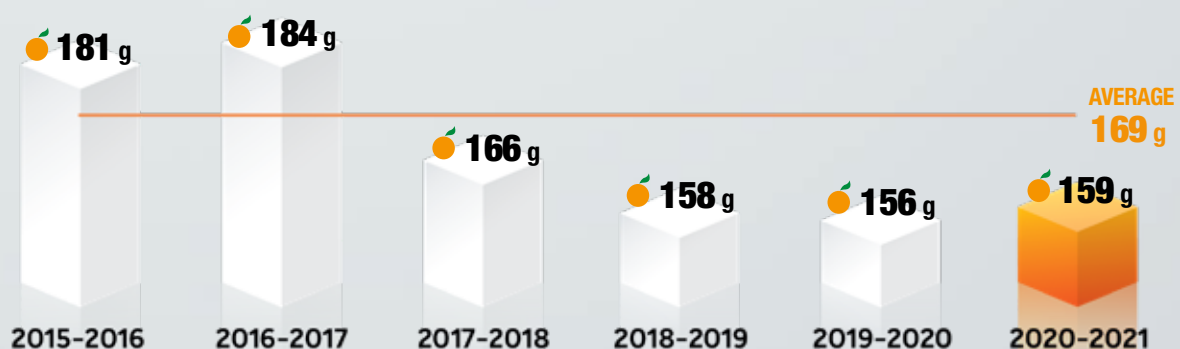
"The water shortage in most of the citrus belt is inhibiting the growth of mid-season and late oranges that should be harvested at a lower than estimated weight", highlights Vinícius Trombin, crop forecast survey (PES) coordinator at Fundecitrus. 🍊

FRUITS PER BOX AND DROP RATE

All varieties considered, the average size of 257 fruits per box projected in May, equivalent to oranges with an average weight of 159 grams, remains the same, since the increased fruit weight for early varieties should be offset by the reduced weight for the other varieties. "Should this weight be confirmed as harvest progresses, oranges will be approximately 6% smaller than those in the last five crop seasons", states Trombin.

The projected fruit drop rate rose from 17% to 17.30% average, all varieties considered. This slight adjustment is due to the increased fruit drop observed for the Hamlin, Westin and Rubi varieties. The second forecast update will be published on December 10.

AVERAGE WEIGHT OF FRUITS PER CROP



The man who set up the processing plant

FRENCH ENGINEER
JACQUES BENCHETRIT
DESIGNED THE FIRST
LARGE ORANGE JUICE
PLANT IN BRAZIL IN 1963

"I arrived in Brazil in January 1963. I came here to set up a plant and leave... [laughter] but I stayed." Just as an early season Hamlin orange tree filled with fruit, so is his laughter filled maybe with nostalgia, maybe with satisfaction. It is hard to tell whether this is a young man of 32 to 33 years of age imagining the story he would tell his 90 year-old self, or if this is a 90-year-old gentleman of moving lucidity thinking back of being young, contemplating life. Laughter marks a pause before the final conclusion: "I stayed".

Stayed where? By leading the project for setting up the first orange juice plant in Brazil, currently the largest world producer, Jacques Benchetrit wrote one of the most important chapters on the sector in the country, when agriculture merges with industry to create an economic universe of rare strength. He stayed and ended up being part of Brazilian citriculture.

WHY DID YOU COME HERE?

In 1962, after much wandering around the world, I had just set up an orange juice plant in Valência, in Venezuela, for the Toddy Group. In December, Florida [US] went



VALMIR CAMPOS

through one of its worst frosts, which impacted production and created opportunities for Brazil. That was when the Toddy team invited me to study the viability of setting up a plant here.

WHY ARARAQUARA?

Brazil already exported fruit and Limeira [SP] was the oldest orange growing hub in São Paulo, where a small plant produced canned, hot pack, not frozen, sterilized concentrated orange juice for the English market to make orangeade from. After Limeira, we visited Bebedouro [SP] and Araraquara [SP]. We picked Araraquara for a quite simple reason: I had already carried out the study, needed 900 kW of power, and only Araraquara had that capacity available. It was January and it was important to commission the plant in June, when the crop season started. It took

144 days to build the company. It was called Suconasa. Four million dollars were invested. Much of the equipment, such as FMC extractors or the centrifuge from Germany, we flew it all in, it was a beautiful thing. The company was paid back for its investment within one year and earned a profit of about five million dollars. That, I guess, was the major driver of citriculture, because the business created a large demand for oranges. We processed one million boxes that year, which sounds amusing now, doesn't it? That was Suconasa.

WHAT CUTRALE ENDED UP BUYING.

Something really sad happened in September 1963. Pedro Santiago [founder of Toddy] passed away. He had appointed each of his sons-in-law as head of a separate company, but they started disagreeing. I left the company in the begin-

ning of 1964. Poorly managed, the company breathed its last and was then acquired by Cutrale. Something interesting is that I helped a lot in purchasing oranges and one of the growers was José Cutrale. He took me to Bebedouro to see where his orange groves were. We hired a twin-engine Cessna. It was the first time José Cutrale boarded a plane.

HOW WERE CUTRALE, CARL FISCHER AND EDMOND VAN PARYS?

After leaving Suconasa, I set up Van Parys' Citrobrasil plant in Bebedouro, worked a great deal with him and we shared a nice time together. Van Parys was instrumental in helping fund the planting of orange trees. At that time, Citrobrasil represented approximately 60% of orange exports from Brazil. Fis-

“BRAZIL TODAY IS THE ONLY COUNTRY CAPABLE OF PROPERLY PRODUCING FOOD IN LARGE QUANTITIES. AND ESPECIALLY IN SÃO PAULO THERE IS A CONSCIOUS FEELING OF SUSTAINABILITY, WHICH IS INCREASING. I AM VERY OPTIMISTIC.”

cher is German. I liked Fischer. He came to Brazil later than Van Parys. He joined an American group [*Pasco Packing Company*] to set up the plant in Matão [*in 1964, today's Citrosuco*], before Van Parys set up his in 1965 [*now a Louis Dreyfus unit*]. Cutrale's major growth driver was its association with Coca-Cola,

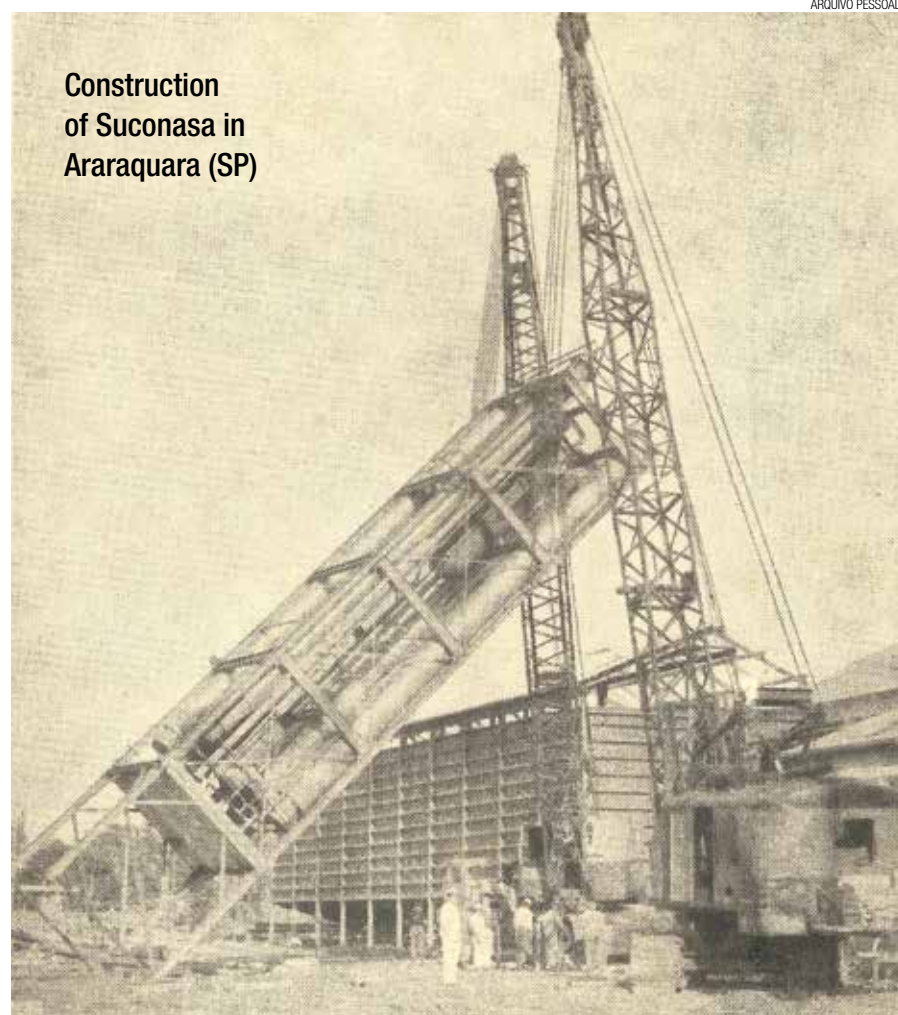
which took care of sales. The Cutrale group was a rather positive factor within Brazilian citriculture.

YOU BECAME AN ORANGE GROWER.

At Suconasa I made friends with a magnificent architect that was in charge of building the plant, Nelson Barbieri. Then, it must have been in 1964 that we bought 20 alqueires. Later we started purchasing neighboring farms. At the time [*until 2009*], everything was planted with orange trees. Joaquim Dragone [*agronomist, former board member at Fundecitrus*] was who helped me a lot in those plantings. We fought the greening disease (huanglongbing/HLB) for five years, eradicating orange trees until the grove was gone. Now I have become, in part, a sugar cane grower. My dream is to go back to planting orange trees on my farm.

HOW DOES EUROPE SEE BRAZIL?

Brazil today is the only country capable of properly producing food in large quantities. Brazil is changing a lot with technology and that will allow for the management of the production sustainability. It is not going to be easy. We have two major problems. One of them is that Europe does not understand Brazil. That is a pity. Europe used to have woodlands but no longer does, it has all been deforested. There is a feeling of guilt they want to transfer to Brazil, where we also really have serious deforestation problems. The other problem is that of competition. There is no other country with the same climatic conditions, land availability and skilled labor to produce food. And especially in São Paulo there is a conscious feeling of sustainability, which is increasing. I am very optimistic. 🍊



Construction of Suconasa in Araraquara (SP)

Preservation as ideology and productivity gain

BY CONSERVING NATURAL RESOURCES, THE ÁGUA BOA FARM MANTAINS THE CYCLE OF NUTRIENTS WITHIN THE PROPERTY

So simple is the stretch of the bucolic side road close to Aguaí (SP), just beyond the small bridge over the Itupeva river. To the left, slim eucalyptus trees waltz to the rhythm of the wind that, although soft, helps soothe the heat of more than 30 degrees Celsius of that late September morning, on spring's eve. To the right, an orange grove remarkably surrounded by dragon trees with their long leaves leaning over the landscape, in their own shade of light green. At the entrance to the Água Boa farm (Good Water in English), a fully flowered golden trumpet tree stands and a road lined with tall trees on the right leads to the administrative office. The pride taken shows how much groves are cared for and how

nature is treated with respect.

According to the crop forecast survey (PES) carried out by Fundecitrus, based on methodology developed by Embrapa Territorial, the São Paulo and West-Southwest Minas Gerais citrus belt has one hectare of conserved native vegetation for each 2.5 hectares planted with citrus. Água Boa is one of the farms that contribute to this very high average ratio between production and conservation, characteristic of the citrus planted area in São Paulo and Minas Gerais: out of the 350 hectares of the farm, 259 hectares are planted with orange and acid lime, totaling 125 thousand trees, and 91 hectares correspond to the legal reserve area and the Permanent Preservation Area (PPA).

When the Dutch van den Broek family purchased the farm, they renamed it Água Boa due to its abundant water resources. This change symbolized the new environmental mindset that the management would incorporate from then on. A matter of attitude.

PREPARING THE GROUND FOR THE FUTURE

Richard van den Broek, whose grandfather was Dutch and whose father was born in Holambra (SP), tells that the legal reserve areas and the PPAs were outdated, with many exotic plants, the guinea grass taking over, waste being disposed of where plants were not grown and many plastic packagings.



"We cleaned up the area, leaving only native species. We amended the soil and picked up all the trash", he lists. "Then we set up an efficient collection system, with waste sorting. Only the organic waste stays on the farm and it is reused as fertilizer, together with mineral nutrients. Plastic, whose presence in the environment is a worldwide problem, is sold to a recycling company, rather than burned", he tells. "And the woods grew stronger. There they are, all vigorous", Richard adds.

As an agronomist graduated from ESALQ/USP, he states that good agricultural practices generate environmental gains. To replant groves, the farm protocol determines that uprooted trees be cut up into logs, then ground and used to fire boilers – Água Boa has signed a partnership with a company in the region that purchases the wood chips. Therefore, wood burning after a governmental permit is issued by the Environmental Company of the State of São Paulo (CETESB, acronym in Portuguese) is restricted to the roots.

Next comes soil preparation, lay-



MARIA CLARA EPFANIA

ing out of contour lines – that will prevent weathering away of topsoil and the resulting loss of nutrients, obstruction of water streams and sediment infill in water streams – and no-till planting on stubble, without disturbing the soil.

Before planting nursery citrus plants, Água Boa employs a brief three-cycle crop rotation for approximately one and a half years of growing grains and legumes – soybean, corn and winter crops such as wheat and white oat in the colder periods. Citrus is planted only afterwards.

Richard explains that this rotation helps in the soil physical management, avoiding compaction and erosion, and also in the biological management, since it can, without agrochemicals, control pests that

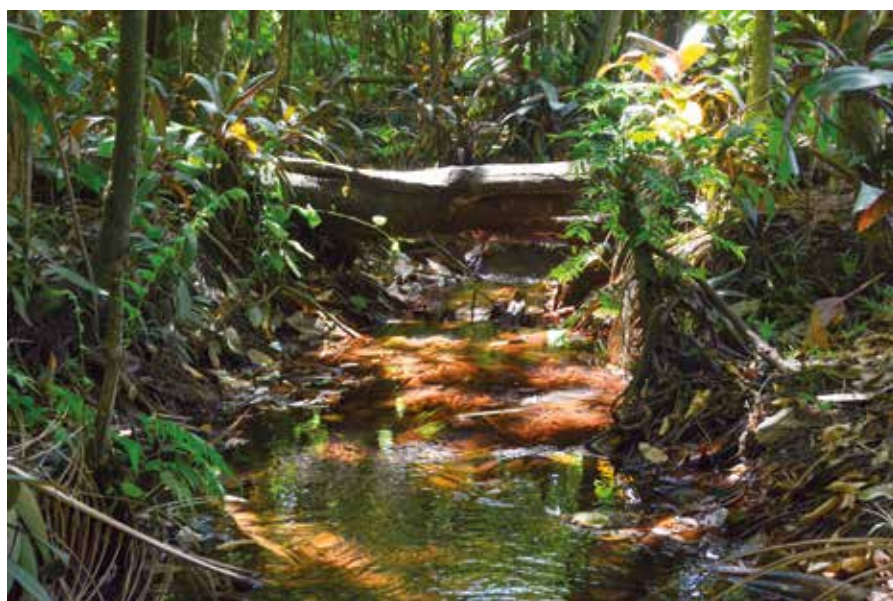
colonize citrus roots, namely nematodes that affect the development of the aerial part of the plant (canopy) and *Phytophthora* (fungi), the causal agent of gummosis that rots the base of the trunk.

A MATTER OF CULTURE

But where does this awareness come from? Richard speculates about two factors. First, he considers that new generations, of which he, at 31 years of age, views himself as part, will from now on be increasingly more connected to, plugged or immersed in environmental challenges.

"The digital era favored not only the access to information but also the instant interaction among people. With that, besides easily acquiring knowledge and being able to immediately exchange experience, citrus growers are increasingly more connected to customers' expectations and demands, regardless of where they are", he assesses.

However, he takes important exception. "Of course I am privileged. I had the opportunity of attending and graduating from one of the most prestigious universities in the world, known both for teaching and research [ESALQ/USP]", he ponders. "How can a countryman, who wakes up at dawn to milk cows and then spends his day preparing the soil, planting, managing and harvesting, study? When will he



study?” he asks. “That is why institutions such as Fundecitrus, which develops technologies and advises citrus growers, are so important. Fundecitrus provides information and support to citrus growers”, he concludes.

Secondly, he credits his Dutch descent for this awareness. “Here [in Brazil], the problem is not land availability, let alone water resources, but rather it is their use. Over there, land availability is a problem. Therefore, in the Netherlands, farming and livestock production have always been intensive rather than extensive. There, planning has always been needed as well. For instance: winter is harsh and therefore you have to prepare for it in advance to make sure animals are fed in the barn for five months”, he states. “The Dutch that arrived here post-war continued working in Brazil just as they used to in the Netherlands”, he infers.

‘EUROPE MUST UNDERSTAND THAT THERE ARE DIVERSE BRAZILS’

Richard, however, while developing his hypotheses, decides to add one third factor, this time about the perception of Brazil abroad. “Unfortunately, people in Europe... No, I will not generalize because that is exactly what I will criticize. Many people in Europe mistake São Paulo, which is quite developed and where the main citrus belt in the world is, they mistake it for Acre or Roraima. We [citrus growers in São Paulo] are thousands of kilometers away from them. There are several Brazils within Brazil. And São Paulo is a modern Brazil. I suppose they do not understand that because over there countries are relatively small. Brazil is of continental size”, analyses Richard.



CARE FOR THE RIVER THAT HELPS CARING FOR THE GROVE

The Itupeva river starts between Aguai and São João da Boa Vista (SP), in the sedimentary region of the Mantiqueira mountains. It flows towards the inner part of the state of São Paulo to reach Aguai, a city with approximately 35 thousand inhabitants and whose sanitation management (water supply and sewage collection and treatment) is done by the Basic Sanitation Company of the State of São Paulo (SABESP, acronym in Portuguese), a state government owned company. The river then crosses Água Boa and ends its journey as it merges with the Mogi-Guaçu river, close to Pirassununga (SP), a tributary of the Pardo river that flows into the Grande river. After a permit is issued by the water and electric power department Water and Electric Energy Department (DAEE, acronym in Portuguese), a governmental agency managing water resources in the state of São Paulo, Água Boa catches water at one point along the four-kilometer Itupeva river stretch that runs across the property, fully enclosed by preserved riparian woodland, and then pumps the water into a buffer tank that sits next to the farmhouse. Water leaves this reservoir and is used for drip irrigation, the most rational irrigation model available and employed in the dry months of May to September, to advance flowering and fruit growth.

The environmental work carried out by the van den Broeks at Água Boa has enabled the recovery of water springs. In one of them, water bubbles out of the ground, runs shallow and crystalline a few meters away from the grove, surrounded by the woods where jucara palms stand out just as nature intended them to spread. The sound of water in that early sunny afternoon in September brings tranquility. To the moment. And to the future. 🍊

Greening affects 20.87% of the orange trees in the citrus belt

DESPITE THE INCREASE FOR THE THIRD YEAR IN A ROW, THERE ARE REGIONS WHERE THE DISEASE RATE REMAINS LOW AND OTHER MORE CRITICAL REGIONS WHERE THAT RATE DECREASED

The yearly survey on the incidence of greening (huanglongbing/HLB) carried out by Fundecitrus shows that 20.87% of the orange trees in the São Paulo and West-Southwest Minas Gerais citrus belt present symptoms of the disease, corresponding to approximately 41 million trees. This rate is 9.7% higher than that of 2019, estimated at 19.02%, and has been on the rise since 2018, when it was 18.5%.

Fundecitrus general manager Juliano Ayres shows concern about the upward trend that is mainly due to diseased plants being kept in adult groves, although he also highlights that there are regions where the incidence remains low and others where the disease rate decreased or is stable.

“On one hand, data sets off a warning signal for the need to reduce the greening incidence. On the other hand, there is good news: in addition to the low incidence in regions neighboring the citrus belt, the external management associated to a strict internal management is effective and has influenced the decrease and stabilization of the disease incidence in areas considered to be critical, such as Matão and Duarte”, he assesses.

In Matão, Duarte, São José do Rio Preto, Votuporanga, Triângulo Mineiro and Itapetininga, the disease incidence has decreased or stabilized, staying within the rates seen in the last five years. In Brotas, Limeira, Porto Ferreira, Avaré, Altinópolis and Bebedouro there has been an increase in the disease incidence.

Citrus greening was identified in Brazil in 2004, and since then research developments have made it possible to maintain competitiveness in the Brazilian citrus belt, the world's largest region growing oranges for processing. Despite the increased average disease incidence, its rate remains well below the estimated 90% for Florida (US).



AT THE FAR ENDS OF THE CITRUS BELT, CLIMATE HELPS LOWER DISEASE INCIDENCE

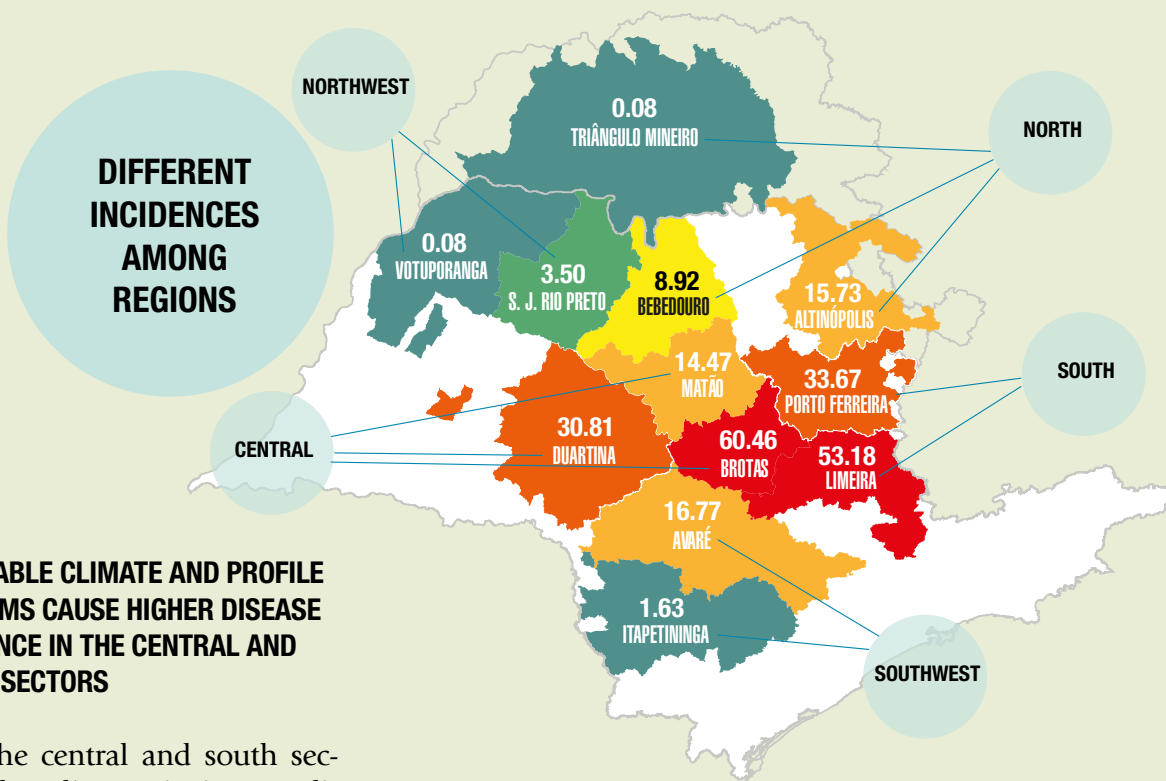
The far north, northwest and south ends of the citrus belt have the lowest incidence of greening due to their less favorable climate for the psyllid and the bacteria. In the north and northwest sectors there is

a lower amount of rain and higher temperatures, which decreases the frequency of shoots, affects the psyllid development and the bacteria multiplication in diseased plants – the lower the concentration of bacteria the lower their acquisition by the psyllid and consequently the disease dissemination rate.

In the southwest sector, rains

are heavier and well-distributed throughout the year, although the temperature, lower than in the other regions, affects the psyllid development.

These sectors present the lowest psyllid capture rate recorded by the Fundecitrus Phytosanitary Alert system that monitors the insect population fluctuation.



FAVORABLE CLIMATE AND PROFILE OF FARMS CAUSE HIGHER DISEASE INCIDENCE IN THE CENTRAL AND SOUTH SECTORS

In the central and south sectors, the climate is intermediate between those in the north/northwest and southwest, favoring new shoots, the insect and the bacteria and therefore the disease dissemination nearly throughout the year. Citrus greening was first identified in the central sector where therefore it has been around the longest, which together with favorable climatic conditions, has led to higher incidences that gradually decrease towards the far ends of the citrus belt. Another factor is the size of farms and the distance among them. Smaller farms have

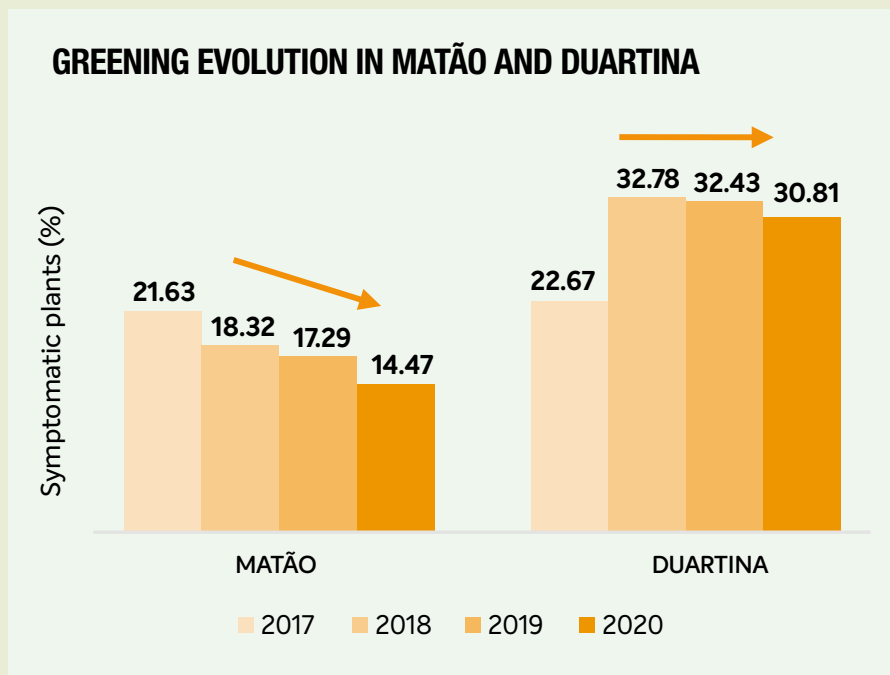
a higher percentage of area at their borders (first 100 to 200 meters within a border) in relation to the total area, with the most infections by psyllids coming from outside the grove. The closer (more concentrated) the farms are, the greater the influence of the management adopted in neighboring groves. And the higher the number of farms in the region (density), the harder to organize farmers towards regional greening management, with sprayings being coordinated by the Phytosanitary Alert system

and with partnerships made for external actions to reduce contamination sources.

The regions of Limeira and Porto Ferreira, with a high incidence of greening, have the most orange trees on small and mid-size farms (below 200 thousand trees) that are very close to one another and numerous in the same location. Brotas, also with a high disease incidence, has an intermediate density of citrus trees. These regions present the largest populations of psyllids recorded by the Phytosanitary Alert system.

INTERNAL AND EXTERNAL MANAGEMENT DECREASES INCIDENCE

The disease incidence has decreased for three consecutive years in Matão (-16.3% in relation to 2019) and has stabilized (at -5%) in Duartina, although it is still considered to be high. These regions presented the highest rates of participation in external management actions taken in partnership with Fundecitrus, of 77.4% and 51.9% of the commercial citrus area, respectively. In São José do Rio Preto, the disease incidence remains low and 43% of the commercial citrus area participates in external actions. “Despite the disease-favorable climate, the incidence is progressively lower in Matão and is stable in Duartina due to the coordinated action taken by citrus



growers to control psyllids and reduce inoculum sources inside and outside groves”, Fundecitrus researcher Renato Bassanezi emphasizes. “These cases show us that it

is possible to successfully control the disease and that growers united towards a rigorous management may positively reflect on a whole region”, he adds.

GROUPS FOR EXTERNAL MANAGEMENT



Since 2018, Fundecitrus has invested to support citrus growers in carrying out external management and enabled the establishment of joint work groups – today there are 31 groups working in the citrus belt, with 278 farms involved. In the regions of Matão and Duartina, practically all farms that carry out external control take part in those groups. According to Fundecitrus agronomist Ivaldo Sala, who coordinates external management actions, the unity of citrus growers is decisive in the fight against the disease. “In addition to shared costs, greater availability of professionals and the possibility of expanding the work’s reach, the joint action of neighbor citrus growers increases their engagement and commitment to control greening even internally on their farms”, he comments. “It is a matter of adding efforts. Without the regional mobilization towards a joint control, it is very difficult to decrease or stabilize the disease incidence”, he asserts.

Solidarity chain

SOCIETY AND LINKS OF THE CITRUS CHAIN UNITE FOR EXTERNAL ACTION AT APAE IN TAQUARITUBA (SP)



Visit the Fundecitrus's YouTube channel to see this and other actions

Raising the awareness of the population about the importance of external management actions to decrease the incidence of greening (huanglongbing/HLB) in the citrus belt was the decisive step for the Association of Parents and Friends of Exceptional Children (APAE, acronym in Portuguese) in Taquarituba (SP) to replace its diseased plants by other fruit trees, which shows the strength of the campaign #unitedagainstgreening launched by Fundecitrus in 2018.

Nurserywoman Flávia Nunes is aware of the risk citrus plants that are not managed as recommended pose to commercial groves, since they are feeding and reproducing sites for the vector insect transmitting the greening bacteria. When visiting APAE, she noticed several acid lime and orange trees there, so she talked about the campaign. "I asked whether they would agree to replace those trees by other nursery fruit-bearing plants, and

they said yes. I contacted Mr. Lourival Monaco to ask if he would like to participate in this action by donating boxes of oranges to the institution, and he agreed too", she says.

Citrus grower and Fundecitrus president Lourival Monaco says that fighting greening is a demand that goes beyond the citrus chain and that encouraging and establishing cooperation with all those willing to collaborate with the campaign is vital. "APAE decided to replace plants without making any special requests, simply to contribute to the economics of the city and the safety of society as a whole", highlights Monaco.

To replace the citrus plants, several nursery fruit-bearing plants such as of guava, dragon fruit and star fruit were planted and since then oranges have been donated every two weeks to be consumed by more than 100 students that attend the institution daily.

According to teacher at APAE Gabriel Soares, this action also encourages a healthy diet. "This donation [of oranges] is very important because students have their meals here", he highlights.

Fundecitrus agronomist Guilherme Rodriguez, who works in the region and participated in the action, reinforces that it benefits both citrus growers and society at large, collaborating to keep greening incidence rates low on neighboring farms and in the region. "That also establishes ties between the community and the production sector, which is extremely important since citriculture supplies 200 thousand direct and indirect jobs, generates income and therefore must stay strong", he concludes. 🍊

MARIA CLARA EPIFANIA

