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**IMPACT OF THE DROUGHT ON
AGRICULTURAL INSURANCE IN THE
MERCOSUR REGION**



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ACRONYMS

ADIRA	Insurers in the interior of the Argentine Republic
AI	Artificial intelligence
BSE	State Insurance Bank
CAA	Argentine Agroindustrial Council
CONAE	National Commission for Space Activities
ENSO	El Niño/Southern Oscillation
MGAP	Ministry of Livestock, Agriculture and Fisheries
NOAA	National Oceanic and Atmospheric Administration
PDSI	Palmer Drought Severity Index
TDVI	Temperature Vegetation Dryness Index
WWA	World Weather Attribution

IMPACT OF THE DROUGHT ON AGRICULTURAL INSURANCE IN THE MERCOSUR REGION

Introduction

Extreme temperatures and unusual weather phenomena have recently coexisted in the Mercosur region and in several countries around the world.

Climate change is crossing extreme event thresholds, the phenomenon is changing their intensity and frequency.

On the north coast of Australia, years of extreme heat and drought have stressed hundreds of kilometers of mangroves along the Gulf of Carpentaria coast. The intense El Niño phenomenon (ENSO) of 2015-2016 delivered the coup de grace by causing a temporary drop in sea level of 40 centimeters that dried up the roots of the mangroves.

In Russian Eastern Siberia, in the year 2021, 8.4 million hectares burned in this region famous for cold. In this region, whose area is twice that of Alaska, small fires occur, in 2021 an area four times the annual average burned, perhaps releasing the ancient carbon sealed in the permafrost and transforming the forest into grasslands.

On the southeastern coast of Brazil, the same El Niño episode that caused the death of Australian mangroves caused a storm that affected the mangroves of the Piraqué-Mirim river estuary. The drought had already stressed these trees, in part by increasing water salinity, hail and wind that killed nearly a third of them.

In Sierra de Jémez, New Mexico, ponderoso pine has survived 15 fires since 1650, most of which were put out in the 20th century. The forest accumulated fuel, a long drought set in and in 2011 a mega-fire devastated 117 square km, an ecosystem that will never be seen again.

In Hölstein, near Basel Switzerland, they study which trees will be able to survive a hotter and drier future? Within the framework of a 20-year project that seeks to answer these questions, two scientists from the University of Basel regularly enter the canopy of a research forest, measuring the water vapor released by a common spruce through its needles. .

In 2018, Central Europe experienced the worst drought in five centuries. Summer temperatures were 3.3°C above average.

On the other hand, Germany saw 300,000 hectares of forest die between 2018-2020.

In the Mercosur Region, between September 2020 and March 2023, extreme drought and heat waves caused significant production declines in the agricultural cycle.

The phenomenon of drought was the great protagonist of the agricultural campaign, production projections, especially soybeans and corn, have been the most affected.

A generalized impact of La Niña with lower than normal rainfall was observed at the regional level, the ENSO phenomenon arises from the interaction of oceanic and atmospheric factors and which, in turn, when installed produces alterations in the normal patterns of oceanic and atmospheric variables. .

In this context, the impacts on the soybean, corn and wheat chain project a significant decline in exports. Agrifood production constitutes the mass of exports in the region, the decline in this sector due to the phenomenon of drought has experienced a catastrophe in foreign trade and state reserves.

In this research work we will deal with the phenomenon of drought in the most affected countries of the Mercosur region, Argentina and Uruguay, the economic consequences and the behavior of the insurance market in the face of this phenomenon.

El Niño / La Niña ENSO Phenomenon

El Niño/Southern Oscillation (ENSO) is a natural phenomenon characterized by fluctuating ocean temperatures in the central and eastern part of the equatorial Pacific, associated with changes in the atmosphere. This phenomenon has a great influence on the climatic conditions in various parts of the world.

The ENSO is one of the most important patterns of the so-called interannual climate variability, which includes changes in the circulation of the atmosphere that can last from several months to a few years. El Niño and La Niña are the oceanic components, while the Southern Oscillation is the atmospheric component, both of which give rise to the term El Niño/Southern Oscillation. This phenomenon comprises three phases: El Niño, La Niña and a neutral phase.

The effects of this oscillation on our region are diverse and vary depending on the phase, the region and the time of the year. Particularly during the spring and summer it tends to record higher than normal rainfall during an El Niño phase. During the La Niña phase, the same area tends to record below-normal rainfall.

The phenomenon has irregular periodicity, usually occurring every two to seven years, and an El Niño/La Niña phase is declared when sea temperatures in the tropical eastern Pacific rise/fall 0.5°C above/below average for several consecutive months (5 quarters).

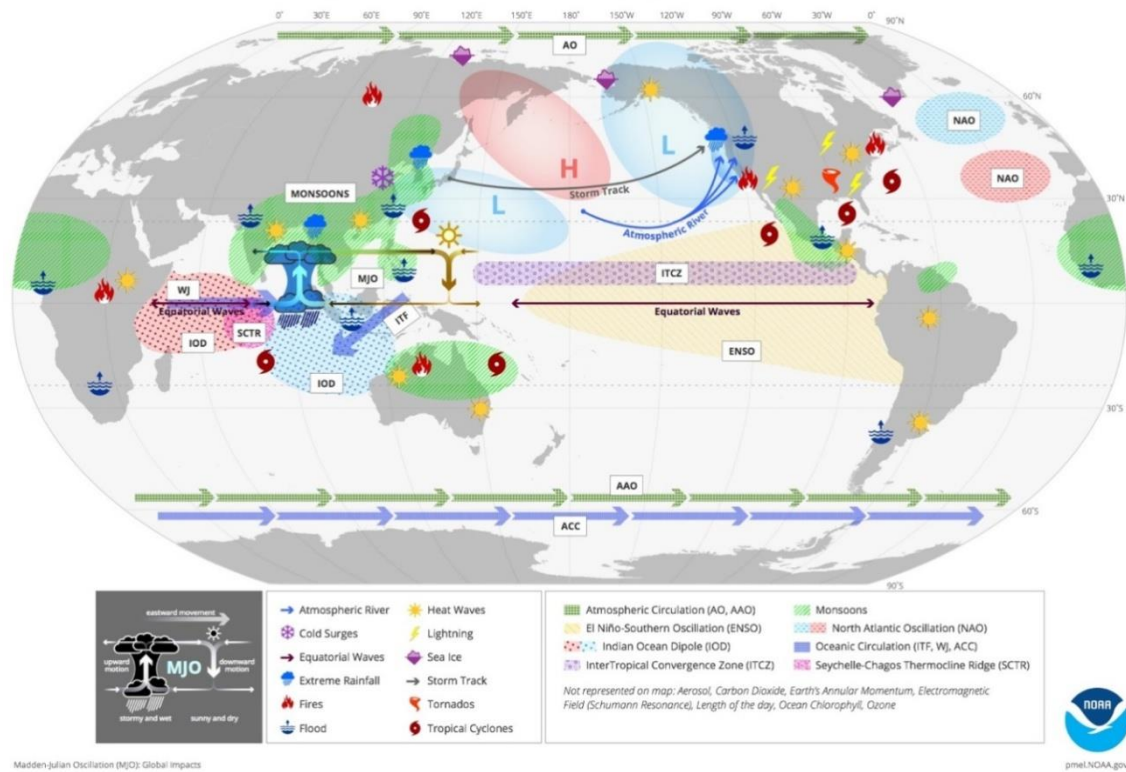
The Southern Oscillation is the atmospheric component of the phenomenon. One way to measure it is through the SOI index (Southern Oscillation Index): an anomaly of the monthly average pressure difference between Tahiti (French Polynesia) and Darwin (northern Australia).

The sea temperature is modified during El Niño-La Niña events, as well as the temperature of the atmosphere. Over the ENSO zone it is monitored at a height of 5000 meters.

The MEI index (Multivariate Enso Index), calculated at the ClimateDiagnostics Center (NationalOceanic and Atmospheric Administration – NOAA). This index is based on a combination of the main six variables observed over the Equatorial Pacific:

- . sea level pressure
- . Zonal and meridional surface wind components
- . sea surface temperature
- . air temperature
- . Total fraction of sky covered by clouds

MADDEN-JULIAN OSCILLATION (MJO): GLOBAL IMPACTS



Drought

Concept

Drought is defined as a period of abnormally dry conditions lasting long enough to cause a serious hydrological imbalance. Low rainfall during the growing season affects crop production or ecosystem function in general (due to soil moisture deficit, also called agricultural drought), and during the runoff and percolation season it mainly affects water contributions (hydrological drought). Moisture and groundwater stored in the soil are also affected by increases in actual evapotranspiration and decreases in precipitation. Any period with abnormal precipitation deficit is defined as meteorological drought. Megadroughts are prolonged and extensive droughts, lasting much longer than normal, usually a decade or more.

Wilhite and Glantz (1985) categorized the definition of Drought into four groups according to the scientific discipline from which the phenomenon is analyzed: Meteorological Drought, Hydrological Drought, Agricultural Drought, Socioeconomic Drought.

Palmer Drought Severity Index (PDSI)

The Palmer Drought Index (PDI) (1965) was developed as an index “to measure moisture deficiency”. It is based on the concept of demand-supply of water, taking into account the deficit between the actual precipitation and the precipitation necessary to maintain climatic or normal humidity conditions. The calculation procedure requires as input data, Potential Evapotranspiration, monthly precipitation and useful soil water content.

The Palmer index is part of a monthly moisture balance and uses precipitation and temperature records for this. The calculation method assumes that the superficial layer of the soil is capable of storing up to one inch of water (25mm) and considers it as a constant value for all cases, while the second sub-surface layer can store all the potential capacity of the soil. ground, minus 25mm. There is no moisture recharge in the lower layer if the upper layer has not been fully recharged. It is also not suitable for places with an arid climate.

The objective of the Palmer drought severity index is to provide standardized measures of humidity conditions, in such a way that it allows comparisons between different locations and distinguish the duration of each event. The index developed criteria to determine when a drought (or a wet period) begins and ends. It can be done for a particular point and analyze its evolution in time, or in many points at the same time in order to establish a map that shows the values of the index in different areas.

An attribution study carried out by World Weather Attribution (WWA) analyzed the role that anthropogenic changes in climate may have on the reduction of rainfall.

Since 2019, much of Argentina and neighboring countries have been experiencing drought conditions. In the last four months of 2022, only 44% of the average precipitation was received, which translates into the lowest value in 35 years.

Is climate change the cause of the phenomenon? A group of scientists from six countries, led by World Weather Attribution (WWA) carried out an attribution analysis, with the aim of determining the relationship between both actors.

In order to quantify the effect that anthropogenic climate change has on drought in the region, computer model simulations were analyzed and the current situation was compared with the climate of the past.

In this study, they focused on precipitation levels for the last quarter of 2022 (October-November-December) for a region that includes a large portion of Argentina, all of

Uruguay, and southern Brazil. Given the current climate, the chances that there is so little precipitation are around 5%, but they did not find sufficient evidence that this is due to climate change.

An important factor to take into account when looking for the causes of the rainfall deficit may be La Niña, which during 2022 was present for the third consecutive year. In the study region, this event increases the possibilities of high temperatures and low precipitation.

The role of temperatures

In this region of South America, intense heat waves were observed, which increased in frequency, intensity and duration due to climate change. The scientists who authored the study noted a possible relationship between high temperatures and drought.

The models studied showed that the temperature values recorded at the end of 2022 (attributed to climate change) have an impact on the decrease in available surface water. This would indicate that climate change probably reduced the water reserve, which aggravated the drought situation.

One of the most affected is the agricultural sector, since it generates thermal and water stress on crops. The high impact of drought on agriculture speaks of a need to reduce vulnerability to drought in the region. Measures such as improving water management and efficiency, anticipating drought through seasonal forecasts, and insurance that helps farmers during “dry years” can increase resilience to these events.

Drought in the Argentine Republic

The scourge of drought in Argentina has been recorded since ancient times. In the General Archive of the Nation you can consult the minutes of the extinct Cabildo of the City of Buenos Aires, dating from the founding of the city, where the existence of the phenomenon is recorded.

In the month of February 1617, due to the lack of adequate rainfall, it was requested to go to ask God with processions, masses and suffrages so that it would serve to send it.

In the summer time of the year 1625-1626, the great need that the city and its farms have for water for wheat and other things is recorded.

On the other hand, in the news of the time, the period between the years 1701-1720 is named as “la Seca Grande”.

The influence of the event called "La Niña" for the third consecutive year in Argentina, took on the dimensions of a natural disaster, as it is one of the longest droughts in history, with effects on the countryside.

In much of the territory of Argentina, the rainfall deficit has been observed for three years, in this way each year the crops have taken reserves of stored water from the soil, leaving each dry season fewer reserves for the next. The drought maps prepared by the national drought table, for the month of November in the years 2020, 2021 and 2022, report the dimension of the severity of this drought compared to the two previous years. The spring of 2022 arrived with zero moisture reserves in many regions, which had to postpone the sowing of summer crops, waiting for rains that arrived very late. The sowing delay caused that by mid-November 2022 there was progress on 12% of the area projected for soybean sowing and less than 24% of corn, compared to a year of normal rains, whose sowing level for those dates it is more than 30% soybeans and more than 45% corn. The water deficit increased sowings at late dates, and in some cases, early sowings had to be sown again, in completely dry lots. Planting delays due to rainfall delays cut the productive potential of crops and expose them to unfavorable conditions towards the end of their cycle, such as early frosts when the crop is close to harvest.



Another great impact of the drought on agricultural production occurred when a large part of the crops planted went through the stage in which they define yields, called the

critical period of the crop, in extreme drought conditions, which results in an irreversible level of affectation. of yields, regardless of the rains that arrive later.

The year 2022 was the second year of drought. In Argentina, 42.2 million tons of soybeans, 51 million corn, and 23 million tons of wheat were harvested, according to the Rosario Stock Exchange. This year, the third year of drought, according to this organization, 11.5 million tons of wheat were harvested, and a harvest of 34.5 million tons of soybeans and 42.5 million tons of corn is projected. The wheat harvest has finished, therefore it can be affirmed that 50% of the production has been lost, compared to last year's harvest, and, if the current projections of the BCR are sustained, 18% of soybeans and almost 17% corn. The projections may change according to the evolution of the weather, but the result will always be a lower level of harvest, which results in losses for the field, which will leave the sector with a lack of liquidity and financial support, to continue developing the activity. The rescue measures that until now have been developed by the government for producers affected by drought must still be reviewed to know the proportion of the problem that they address, based on the scope and efficiency with which they would reach those who must continue producing, after a third consecutive drought.

The reduced volume of harvest caused by the drought due to the “La Niña” effect decreases the volume of raw materials available for domestic consumption and for export.

The scarce availability for domestic consumption causes an increase in prices throughout the entire value chain of agrifood, with the inflationary effect that this means, and less availability of raw materials for export results in less foreign exchange income to the country, which puts pressure on more weakness of the current currency, affecting its rate of devaluation against the dollar. The reduction in crop yields impacts the macroeconomic variables that affect the entire country, it will be necessary to address this reality with plans that offer to finance current needs and demand efficiency to meet the payment obligations that these generate. Argentina does not have a good credit presence in the world, with a country risk that is generally ranked second among the riskiest Latin American countries to invest in. This situation of loss of genuine resources, the harvest, leaves the country more vulnerable and with a great challenge for the short term, efficiently manage the shortage.

As an exporter of raw materials, Argentina ranks as the third world exporter of soybeans, the first exporter of soybean meal and oil, the third exporter of corn and the sixth of wheat. This could show that the effect of a lower harvest in Argentina could impact the world, due to less availability of raw materials for export, however, the leading role of Argentina in exports decreases, mainly due to the competition generated by Brazil with its accelerated growth. in production and productivity, supplying the lower supply from Argentina. Brazil ranks first as an exporter of soybeans in the world, second as an exporter of flour and oil, first as a world exporter of corn, and does not appear in the wheat exporter ranking, but advances in the local production of this cereal, to depend less and less on imports. Crop projections show that Argentina would produce 8 to 12 million fewer tons of soybeans in 2023 than last year, while Brazil plans to harvest 27 million more than last year, Argentina projects a corn crop of 8 to 16 million tons. below the 2022 harvest, and Brazil hopes to increase its harvest by almost 11 million. Thus, the smallest Argentine harvest does not represent for the world a risk of lack of supply of raw materials, so international prices have no reason to rise despite our drought.

The Role of the State

The restrictions and climatic adversities that the agricultural sector faces generate a high degree of uncertainty about the final result of the activity, in view of this situation the Argentine State agreed to suspend the payment of advances of the income tax for the affected producers, the creation of revolving funds to finance small producers with banking problems, the refinancing of the liabilities taken with Banco Nación under the same conditions in which they were taken and the generation of new lines of credit at a subsidized rate so that they can restore their working capital, as well as also pay the rent.

Insurance Market

The Argentine Agroindustrial Council (CAA), which is made up of 61 entities, demanded a risk management measure from the Government and Congress. The entity requested an agricultural insurance law.

On the other hand, the agro-industrial chain reminded the Executive Branch that nine months ago it presented a draft bill for agricultural insurance, however, there has not been a favorable response so far.

The entity Adira (Insurers of the Interior of the Argentine Republic) is working on different actions to propose a mandatory comprehensive insurance with State subsidy for the entire country with the characteristic that it is an instrument of protection of the national agricultural system that is the motor of the country's economy.

On the other hand, mention was made of the partial sanction in the Senate of the province of Santa Fe of the Comprehensive System of Agricultural Risk project. This regulation speaks of "benefiting all agricultural producers, both those who produce on their own and leased lands", "contemplate risk prevention actions (prior to the event) and recomposition of the affected working capital (during and after the emergency)". It also refers to "develop coverage and encourage the use of agricultural insurance through premium subsidy."

At the same time, it also promotes financial and/or economic assistance for the prevention and recovery of damage through Development Agencies and Associations. And the constitution of a Provincial Fund to address the comprehensive management of risks.

In the last campaign, the accident rate behaved differently depending on whether it was a fine or coarse harvest, while for the coarse harvest the accident rate would be around 50%, for the fine crop it would reach 200% thanks to the strong impact received by frost in various regions. from the country. However, the global result, although different between the insurers, would be around 65% on average.

Loss claims have yielded a cumulative number close to the annual average of the last 12 campaigns, with values below average in the peak storm months of November and December, but higher in the four subsequent months of 2023.

Technological innovation has impacted agriculture in recent years. The electronic subscription has allowed an unthinkable level of precision and identification of the insured lots. The electronic monitoring of claims and the use of drones have achieved a more agile response dynamics, and the development of the Tasagran application has freed appraisers from uncomfortable elements for on-site field survey. At the same time, it provides them with very useful information for their work. From an administrative point of view, it enabled a monitoring and control framework that consolidates a more efficient and reliable management. Likewise, it has enabled the development of

NetAgro, an application that allows policyholders to obtain additional satellite information. In addition, in the last two campaigns, it allowed the pilot test of telemetry coverage for the risk of drought to be implemented. The AI helps to control the online clusters benefiting the subscription, through a specialized system parameterized data is obtained from different satellite platforms such as MODIS, LANDSAT and SATINEL. As for parametric insurance, although it is not yet widespread, some insurers are developing it and consider that it has a generous growth advantage and it is considered that its development will come hand in hand with a greater insurance culture and the dissemination of benefits offered by this type of coverage. In Argentina has been offered mainly for Drought insurance without achieving much acceptance from the insured.

Consulted the most important insurance companies in the insurance market expressed their opinion on the risk of drought.

First, the insurer **Sancor Seguros** stated that the drought is having a very negative effect on the entire core region of the country. There is talk of losses of more than 500,000 fine hectares in the region of reference.

As far as agricultural insurance is concerned, this drought condition entails a reduction in hail insured hectares and/or a decrease in insured amounts. It is also a reality that in years like these, requests for quotes for multi-risk coverage and/or parametric insurance increase.

We have finished the 21/22 campaign with an accident rate of 66% and events of all kinds. Large fires in forests in the province of Corrientes, very severe hail storms in the center-south of Santa Fe that affected many hectares in mid-December, winds in Girasol in the west of the province of Buenos Aires and frosts of magnitude in March , which have seriously affected late crops.

For the 22-23 campaign, in terms of insurance, we are seeing a decrease in insured hectares, mainly fine, since the conditions of the crops are bad to regular. In coarse we are fine because the agricultural producer contracts ahead of time before sowing, due to the benefits that we grant either with the pre-campaign packs and/or the financing of the policies, and this leads to sales being brought forward.

As for the claims, there have been very important frosts that we are assessing at the moment and from what we are seeing, in some regions they are of considerable damage.

Producers, in relation to these risks (Drought-Fire) usually look for coverage that compensates the difference between the guaranteed yields and the obtained yields (always speaking of losses caused by covered events). This line includes multi-risk insurance, which covers weather damage (not biological).

At Sancor Seguros we offer agricultural multi-risk, a tool that guarantees the investment of the agricultural company in the face of any climatic event, mainly in the event of drought and flooding. On the other hand, we have an innovative Drought insurance based on the satellite water deficit index (TDVI), whose purpose is to cover extreme variations in water deficit in soybean and corn crops. This index is published by a public body such as CONAE (National Commission for Space Activities)

Regarding the volume of hectares insured for the 21-22 cycle, it was influenced by the lack of rain at different times of the campaign. Despite this, we have increased the total insured area by 10% compared to the previous campaign. The most important increases occurred in soybean, corn and sunflower crops.

We have insured more than 5,200,000 hectares

As far as technology is concerned, it will continue to be an ally for the branch, to optimize the different stages linked to the insurance life cycle and make everything more agile and simple for the insured.

The new technological tools and the experience of our company in the field make us think of a great evolution of Agricultural Insurance for the coming years.

In the case of our Insurer, in terms of technological innovation, we can mention a high value-added crop monitoring service that includes:

- a) Green index satellite images (NDVI), for efficient monitoring of the entire crop cycle.
- b) Access to SIMA, an intuitive GIS platform to view the green index maps, plus an App to tour the lots. It allows our policyholders to improve decision-making at each stage of the production cycle.
- c) Online talks, workshops and regional training events, to learn about cases of use of these technologies.

The insurer **La Segunda** agreed that the drought is having a strong impact on agriculture in our region. In some cases, it delays the planting schedules for summer crops and fully affects the yields of winter crops, which, in addition to the stress caused

by the lack of rain, had to endure late frosts that further reduced their yield expectations collection.

From the insurance point of view, this concurrence of events brings with it the additional complication in dealing with claims, of evaluating the damages in conjunction with the corresponding reductions in the insured sum.

Regarding the accident rate of the last campaign, it ended up consolidating at 67%. This represents a value close to what was expected to be able to face structure and marketing expenses, and in turn preserve a minimum profit margin.

Regarding the current campaign, it is premature to talk about accidents because we are in the process of evaluating the damages reported during the month of October and, consequently, they have not been liquidated. However, we can mention that it has been an atypical month in terms of the number of complaints received, which doubled the average of our historical series of the last 12 years. The risk par excellence denounced was that of frost, which up to now already concentrates 87% of the total.

On the other hand, with regard to Drought and Fire coverage, they have always been present in the Argentine insurance market and we could say that, up to now, the meeting with the offer has been satisfactory with respect to fire risk, but not so regarding the risk of drought.

Regarding Fire, most of the basic coverages incorporate it as additional to the main risk of hail in its two modalities. This is like a crop fire, and a stubble fire, which began to have a great preponderance since the consolidation of the practice of direct sowing in our country.

As for the Drought, the meeting between supply and demand has not been so simple. The multi-climate or multi-risk experiences carried out through traditional mechanisms for generating performance thresholds have been failing or, in the best of cases, have not been able to advance on the levels of adoption intended and stated by the demand itself. In those opportunities in which it was decided to ignore the effects of adverse selection, the loss results were catastrophic, and in those in which attention was paid to the problem, operating on balanced positions between the risk and price frontier, the latter were onerous. and caused user retraction. Special consideration should be placed on this point when observing the coincidence between the regions where the probability of water deficit of the main crops sown increases, and the loss of profitability for the same reason stated.

which consequently provides less economic margin to face an additional cost, precisely that of the insurance contract.

The probability of water deficit for the critical periods of the main crops grown in Argentina is not expressed throughout the territory with the same frequency with which it occurs, for example, hail. This alters the risk perception of the insurable. Likewise, the progress in the prediction level that the ENSO forecasts were taking must be added. This variable, increasingly considered by agricultural producers and advisors, very likely constitutes a new element of temporary adverse selection, which adds a complication for the work teams that must estimate the tariff guidelines.

In a historical series analyzed from the last 18 campaigns available, the insured area has grown from approximately 11 to 21 million hectares. This is fundamentally due to the growth in the planting area of extensive grain crops and accompanying the geographical areas in which they have expanded the agricultural frontier.

However, when both data are linked and the proportionality of the insured area versus the planted area is evaluated, a withdrawal is observed from the 2012/2013 campaign, and then a recovery from the 2016/2017 campaign. The trend line for the period ends up showing a curve that exposes a plateau slightly above 50%.

In conclusion, in absolute values, the insured area has been growing in Argentina, but the trend line of the ratio insured area versus the markedly positive planted area, which dominated during the period 2002-03 / 2012-13, has become a flattened curve that accounts for an apparent stagnation.

Indeed, according to data from the aforementioned survey that the SSN carries out year after year, from 2011 to 2021, the number of insured hectares ranged between 17 and 21 million. In 2020 and 2021, it remained unchanged on 21 million hectares.

La Segunda with regard to technology Technological change has had a strong impact in recent years on the insurance market in general and on La Segunda in particular.

The electronic subscription has made it possible to achieve a level of precision and identification of the lots covered under coverage that was unthinkable just twelve years ago.

The electronic monitoring of claims has also achieved a more agile response dynamics and the development of the Tasagran application has revolutionized the claims assessment system. It frees appraisers from uncomfortable elements for field survey, while providing them with extremely useful information for their work. From the point

of view of the central administration, it enables a monitoring and control framework that consolidates a highly efficient and reliable management.

Likewise, technology has enabled the development of **NetAgro**, an application for mobile devices, which allows policyholders to obtain additional satellite information to make management decisions in which vegetation and water stress indices can be seen for each subscribed plot, weather information, make use of a planting density calculator and even take georeferenced multimedia records. In addition, in the last two campaigns it has allowed the implementation of a pilot test of a coverage by Telemetry for the risk of drought, on which there is an expectation of being able to provide forceful answers to old challenges of difficult resolution.

The Insurer Rus Agro said that agricultural risk currently presents a very complicated picture, especially in fine crops, particularly wheat, which was greatly affected by weather issues (drought first and then frost). In relation to coarse crops, the situation is also compromised, taking into account that the water recharge of the profiles was and is deficient for planting. This caused delays in the planting of prime corn, compromising the realization of the crop that can lead to an increase in soybean area.

These unexpected events make us recalculate the models, rethink the predictions, modify the expectations and, therefore, the commercial conditions. Insurance companies must adapt to the new climatic circumstances and constantly monitor issues related to climatic events that occur or are estimated in the various regions.

As for the accident rate, in general terms it was very good. Considering the market results, we were a few points below average.

The campaign ended with good results in both production and accidents, the latter with percentages below the market average, with very strong frost events in areas of Buenos Aires that have had a strong impact on the increase in accidents.

Regarding the prospects for the 2022/2023 cycle, we are focusing on the development of new markets together with our insurance producers and also focusing on the alliances that we have built with strong players in the sector, as well as offering innovative options to the time to cancel the payment of the policies, such as the Agrotoken cryptocurrency.

In relation to fire and drought coverage, the demand has increased, considering the weather conditions known to all: the 'La Niña' phenomenon impacted us for the third consecutive season.

At RUS Agro we work with comprehensive coverage for the agro-industrial sector, tailored to the needs of our clients, depending on the productive activity they carry out. In these cases, it is essential to analyze the type of production, the production cycles and their variations, what are the tasks that are carried out, how is the composition of the farm, etc. It is not the same to have intensive crops in the open sky than productions under cover or with greater implementation of technologies. In addition, it is important to be very clear about the risks that they request to cover, the insured amounts exposed to risk and what deductibles or franchises to be paid by the insured can be applied to reduce the negative impact on the insurance portfolio in the event of claims. Because they are concentrated risks, the impact of a claim is magnified.

Depending on the risks they seek to cover, it is also important to analyze how the loss rate of these events varies. This mainly implies having a Reinsurance Contract that can support the operations.

Regarding the fina campaign, in relation to the insured area, the area was reduced by 50% compared to last year due to the tremendous drought that the country is suffering. As regards the insured area and input and the time of the summer crop campaign, they are advancing according to the zones and optimal planting conditions. However, in areas complicated by water issues and soil profiles, the weather conditions are waiting. In terms of technology, significant improvements are seen with the support of increasingly sophisticated and specific satellites, added to supplier companies dedicated to studying the weather that provide daily updated information. This serves to have a clearer vision of the operations that are contracted.

Regarding the metal-mechanic industry, it is important to point out the great permanent technological advances that allow optimizing yields and production costs.

The Allianz Insurer opined that the drought is very severe, never seen before due to its extension and length of time. Just this week there was rain in much of the agricultural area. However, in other parts it was not enough, as in Santa Fe and Córdoba.

This drought affected us in a lower subscription in the fine harvest. A drop of 40%, 50% of the portfolio, of the insurance intention, as a result of the drought and the loss of crops. And to that we must add some very important frosts, especially in the central zone of the country, which affected a lot. After the drought, the frost of October 9 was lapidary.

Regarding the accident rate, he remarked that they had had a very good campaign, despite the fact that in recent campaigns we have taken selection and statistical measures with a cautious subscription.

There was an accident rate of 50% in the last campaign. Although it was a good campaign in general, we are very satisfied with the accident rate. And 80% or 90% of the accidents we suffered were caused by hail.

Regarding the risks of Drought and Fire, he assured that drought coverage tools are not working. There was a lot of demand for additional toppings like frosting. Those who made the decision to insure themselves early have coverage and a part of their insured losses, because today we are settling claims and evaluating frost damage to the fine harvest.

The same thing happens in a fire and the professional consulted clarified: It was always an additional in hail coverage, with no price differential. It is part of the basic coverage. We have many cases of fires, also a product of the drought, and the high temperatures. Another cause of fire are the combines, when they work in very hot times, at noon, it is very common for a machine to catch fire, catch fire and affect the crops.

Many farmers value coverage very much, because they have suffered from fires and sometimes they are unstoppable. They cover a lot of area.

With respect to the insured area, although it is offset by international and local prices, which are very good, this is not enough to increase the insured area for this campaign in relation to previous ones. The yield expectation is lower, so, in the best of cases, the sums insured may be the same as last year, but not higher, and with a slight downward trend. That is, the sums insured will not compensate for the least insurance. In any case, the last word has not been said. If the weather starts to improve and the rains are beneficial, everything can change for the better.

With regard to technology, he pointed out that it has been a great help, climate forecasts have advanced a lot and are more accurate. Both the immediate forecast to four or five days and the weather trends are quite accurate and help you plan the climate year, the campaign. On that side we have tools that are widely used, free and open access.

Then there are satellite images, or green index images, in which one can monitor crops online at any time of the day and from anywhere. This also allows knowing the history of many months back by the succession of images.

Another aspect that has advanced a lot is the blockchain. The amount of information that agricultural producers and users upload to the networks allows them to find out in detail and very early on what is happening in each area. It is a feedback of information and data that grows day by day.

Drones are also used. It is not a tool as expensive as at the beginning and many agronomists have them. They allow to do the evaluation of damages, to fly over a lot and to see in its entirety the condition in which it is found. It is widely used for appraisal.

Later, in the commercial part, of the business subscription, the web pages that make all. Currently you can work with zero paper and carry out the business administratively without major problems, all very intuitive.

Currently, in the life of the policy, everything is within reach. Technologies are tools that help. A field appraiser is never going to be replaced, but he is given so many tools at his disposal, that he is going to do a much more exact, more detailed job of what is happening.

From the company's point of view, in agricultural insurance it is very gratifying to be offering an input, which is useful and allows the insured to continue in the business. Nowadays any farmer should have an insurance policy because they are not expensive and they really work.

Drought in the Oriental Republic of Uruguay

The Drought phenomenon affected Uruguay in recent years, statistics indicate that the most serious droughts date between 2008 and 2009 and 2018. In 2018, the scourge caused estimated economic losses of 500 million dollars in the country. The lack of rainfall in early 2023 also caused a significant reduction in the availability of and access to water in Uruguay, affecting more than 75,000 people.

Farmers in Uruguay have been investing in technology to combat droughts and mitigate their impact on crop yields. Despite this, climate change continues to affect agricultural production, with forecasts of dry weather until January 2023.

It has been developing policies to manage climate risks since the early 2000s, moving from a disaster management approach to a risk management approach. This includes measures such as early warning systems for extreme weather events and the improvement of irrigation systems for agricultural production.

Steps were taken in 2017 to address the water crisis in the country, including the establishment of a National Water Plan. This plan aims to guarantee sustainable development and access to drinking water for all citizens. In 2019, the World Bank provided more than \$141 million in loans to support this plan and improve the financial sustainability of Uruguay's water and sanitation services.

In October 2022, the Ministry of Agriculture, Livestock and Fisheries (MGAP) declared a state of agricultural emergency for a period of 90 days for the entire country due to drought conditions. The lack of rainfall at the beginning of 2023 caused a significant reduction in the availability and access to water in the country. This phenomenon had serious repercussions in the affected communities, especially those that depend on agriculture. The government and aid organizations provided assistance to those affected by this emergency.

The situation was further complicated by the fact that more than 60% of the Uruguayan territory

suffered from extreme or severe drought in October 2022-January 2023, prompting calls for citizens to make reasonable use of water as reserves dwindle.

Based on forecasts without rainfall forecast, on Monday, June 19, 2023, the President of the Republic reported at a press conference that the government decreed a water emergency in the metropolitan area of Montevideo, Uruguay, where almost 60% of the population resides country population.

The annual accumulated precipitation in Uruguay presents a great variability (figure 1), the accumulated average at the country scale is 1305 mm (reference period 1981-2010). There are extremely dry years, such as 2008 with 758 mm and 1989 with 872 mm, while 2002 was exceptionally wet with 1988 mm.

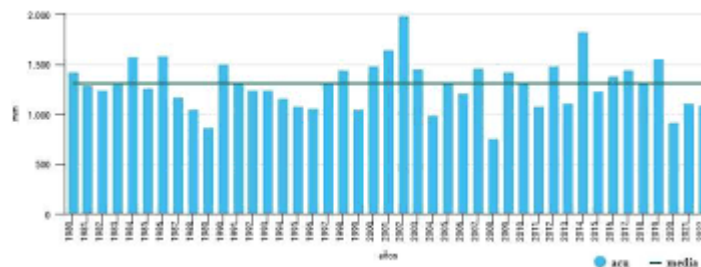


Figure 1 - Cumulative annual average at country level from 1980 to 2022.

The IPE12 (Standardized Precipitation Index) for 12 months (January-December) indicates that 2020 was very dry (severe drought) in almost the entire country, while 2021 was slightly dry and affected the west and center-south coasts. While the year 2022 was dry in almost the entire national territory with a category of severe drought in the south and southwest.

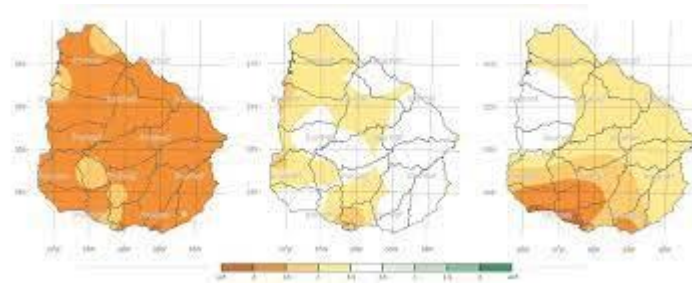


Figure 2 - Standardized 12-month precipitation index, 2020 to 2022 from left to right.

Last quarter: February-March-April 2023 For the purpose of observing the behavior of rainfall, in the last quarter, the monthly anomalies for the months of February, March and April 2023 are shown, expressed as a percentage, taking the period of reference 1981-2010. It can be objectively observed that the anomalies are negative over the entire country, both for February and April, and a surplus in March for the central-eastern zone. The rainfall deficits in February showed that the southwestern zone was the most compromised with a deficit greater than 80%. In the month of March where various precipitation events occurred towards the second fortnight, they generated positive anomalies in a large part of the country, with the exception of the south and southwest (Soriano, Colonia, San José, Montevideo, Canelones, South Florida and Maldonado). , where the deficit ranged between 20% and 40%. While in April, the rains once again presented a negative bias throughout Uruguay, with higher deficit values in the central and northern strips.



Insurance Market

The drought that affects Uruguay caused the greatest losses that a climatic event has generated in the country's history. In areas where an average of 3,000 kilos of soybeans per hectare should normally be harvested, it is difficult to reach 800 kilos per hectare. In this framework, agricultural insurance has an unprecedented role.

It is estimated that the 300,000 hectares that are insured in Uruguay will imply losses of US\$ 150 million for the insurance companies, of which US\$ 95 million correspond to the State Insurance Bank (BSE), this being the largest claim in the history of the entity. While insurance is already part of the cost of production for many growers, this event will lead to a reassessment of yield coverage limits and costs.

Insurance, like any tool applied to production, must be used correctly, but it is clear that for those who did not have yield insurance, it will be very difficult to recover from the bad result left by this summer campaign.

In this context, Aseguradora Sura explained that insurers are money placement financial companies that must provide their shareholders with a return higher than the cost of capital. Therefore, we have to ensure the technical solvency of our products, which means that we have to cover events that can be covered, charging reasonable rates, to achieve an adequate product.

With the development of agriculture, structural problems appeared, for which agricultural insurance is in a process of adaptation to these new realities, where what is sought is to maintain the technical sustainability of an adequate cost-benefit ratio, in such a way that the weather events are covered. However, systemic events, such as this drought, "are very dangerous."

Along the same lines, the BSE Agronomic Department stated that insurance is fundamental in investment, as was demonstrated in this event. In any case, he recalled that in the last 20 years there were 10 harvests with unfavorable results for the insurance, in which compensation was paid for different events such as excess water, hail or drought.

In recent years, the insurance sector has been hit hard, so it is necessary to recalibrate what coverage to provide and with what scope, to make it sustainable, calibration is complex and is done year after year, and in situations like this, when there was a catastrophic event.

Producers with BSE policies are harvesting 400 kilos of soybeans per hectare, on average...

On the other hand, the BSE pointed out that in its opinion reseedling is a hedge that should not exist, it is observed that it begins to generate increasingly significant losses, and forces subscription criteria to be adjusted to make it increasingly profitable. The farmer is the first defender of good agriculture. The region is affected by the same scourge, making it even more difficult to negotiate with reinsurers.

With regard to establishing the price of the insurance, what is done is to consider a series of years, and correct so that the accident rate is within sustainability. When we put this catastrophic year in the series of years, surely the data it will show will be a considerable increase in prices, but we are trying to ensure that the reinsurance market does not include this year in a series of 10, because it is something that can happen every 50 years", Indian. The problem is that reinsurers claim that, with climate change, these events are happening with greater intensity and with increasing frequency.

Growth of the insured area

The BSE considered that it is clear that for some producers insurance is one more input, but there are others who are realizing that it is a powerful tool, and that this was evidenced in the growth that the market registered in the last four years, which it was 40% in area.

The BSE then suggested that insurance companies should seek capital in a reinsurance market, where the interest rates given by the Federal Reserve are much more attractive, with much less risk, while we have to offer this business, which It is very risky and with a lot of exposed capital.

The cost of reinsurance tends to rise and this must be transferred. Although the BSE, due to the capital it has (US\$700 million) and its solvency, has the possibility of leaving the reinsurance, in agriculture we are talking about US\$ 500 million exposed among all coverages, which is very risky.

In turn, he considered that the producer has to "manage everything within his reach" to obtain the best results. There are farmers who are within a tariff condition and others who are out of that line, because they apply more technology, other management measures and have a different performance history.

In the case of private insurers, the reinsurance market is becoming more selective, due to interest rate rises and increasingly frequent and intense weather events. Private companies are trying to adapt to this world, trying to transfer market changes in the best possible way.

The Uruguayan insurance market is on a trajectory of technically recomposing coverage and starting to think about new coverage. There is a universe of possible developments within the insurance industry, which must seek to recognize this reality of technology applied to the sector, developing parametric insurance and seeking to create awareness in the farmer that the more information the insurance industry is given, the better. products will be achieved. On the other hand, the drought showed the exposure that the sector has, valuing the insurance, and showing that it has to be there every year.

The BSE quickly made winter crop fare, selling off the most sensitive covers. While last year the yield insurance coverage –in this case due to excess water– was approximately 4,500 hectares in the BSE, this year the coverage exceeded 32,000 hectares.

It is clear that insurance is a tool that gives stability to the system. In the case of those producers who already use it, it is difficult to stop doing it, while they estimate that the trend will be for more producers to incorporate it.

Regarding the applied technology, there is a lack of data to develop an agricultural catastrophic insurance. We do not have quality information and in sufficient quantity to reach peculiar situations that contemplate the correct size.

The BSE expressed its willingness to work with the authorities, noting that they are part of the project promoted by the Ministry of Livestock, Agriculture and Fisheries (MGAP). It should be remembered that this pilot was planned for three years (from 2021/22 to 2023/24), and is financed by MGAP through the Resilient Agroecological Systems of Uruguay (SARU) project of the World Bank.

The project began to be implemented in July 2021, with the launch of a call for producer agglutinators, who provide data on georeferenced yields of rainfed crops (summer and winter) to the information system developed in this project, in order to contribute to the improvement of the performance insurance offer.

The pilot plan will be successful to the extent that producers are convinced that they have to share that performance information, in order to redesign products with more efficient coatings. Insurance companies currently have more information than that available to the MGAP.

CONCLUSION

Drought is a silent and very dangerous phenomenon, since the losses it causes place it among the most expensive natural disasters.

In the world, this scourge generates more losses than hurricanes or tornadoes, its damage knows no limits since it is not limited to low areas such as floods or tectonic faults as occurs with earthquakes.

When an area registers a long period of scarcity or lack of rain, we speak of a drought.

On the other hand, to talk about rainfall below normal, we have to know the normal values or the climate of the region in question. The most used tool to detect is statistics, the Standardized Precipitation Index method (IPS or SPI) is used to statistically know the lack of rainfall over a particular area.

The extreme episodes were changes observed since 1950, the most intense and prolonged droughts were recorded in some regions, especially in a large part of the Sahel and other areas of South and West Africa.

There is evidence of large regions where average precipitation has decreased and temperatures, consequently evaporation, have increased, giving rise to increasing water stress. This is the case in much of the continental tropics such as northern sub-Saharan Africa and northeastern Brazil. This has also been observed in other regions of sub-Saharan Africa, the Middle East, Central Asia and Mexico and in areas with Mediterranean climates such as southern Europe, the north coast of Africa, Chile and California.

The climatic scenarios indicate a worsening of water scarcity during this century in these regions (Orlovsky and Seneviratne: 2012) where a significant part of the poorest sectors of the planet reside and where the trends resulting from the changes projected for this century lead to increasing aridity and the fall in agricultural production. This will be more serious where agriculture and sedentary or migratory cattle raising are mere subsistence activities in the context of societies that have scarce human and material resources to face the crisis.

This brief worldwide analysis of the scourge of drought allows us to glimpse the availability of information about the vulnerability and the affectation of the different productive areas of risks and processes derived from the climate, which is of increasing importance due to two confluent situations: the intensification and expansion of

productive areas throughout the country and the increase in climate variability and the occurrence of extreme events.

Our analysis emphasized the two countries in the Mercosur region, Argentina and Uruguay, where the scourge of extreme drought was registered, a complex phenomenon that spanned more than three consecutive years, where crops went through critical periods with a reduced volume of harvest. In this context, the most important insurers in the insurance market have incorporated technological innovation that makes it possible to accurately monitor the insured risks.

Like any extreme event, the more vulnerable the affected place, the deeper the impact. For this reason, it is vital to anticipate this phenomenon through the use of early warning systems, that is, indicators that contemplate climatic, hydrological and water aspects in order to anticipate the onset of the drought or during it, take efficient measures to minimize human losses and economic.

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