

Covid-19 pandemic and agricultural insurance market

Impact, changes and conclusions



February 2021

Acknowledgements

This document provides an overview of the actual impact caused by COVID-19 pandemics to agricultural insurance markets in 29 countries. It is based on the survey conducted by AgroInsurance International in July 2020 – February 2021. Survey questionnaire responses were complemented with the personal communication notes and analysis of industry-related public sources.

The authors sincerely thank the many respondents who have kindly contributed with their responses and comments to the questionnaire for Covid-19 Survey, and who provided additional in-country information through personal communication with the authors.

Companies, contributors to this survey, that gave their consent to publish their names:

Agribusiness Consulting Group (Australia) – Loss Adjustment Agency
Topdanmark (Denmark) – Insurance Company
Sompo Seguros SA (Brazil) – Insurance Company
VanderSat (Netherlands) – Service Provider
Opportunity Microinsurance Development Center (India) – Insurance Organization
AEGIS (U.K.) – Underwriting Agency
PT Soemito SM (Indonesia) – Service Provider
JSC Insurance Company GPI Holding (Georgia) – Insurance Company
Ministry of Agriculture and Livestock (Ecuador) – Government Agency
Vereinigte Hagelversicherung VVaG (Germany) – Insurance Company
Munich Re (Germany) – Reinsurance company

The authors would also like to thank Australian-based **ContextPro** company for their help with the editing and proofreading of the final report.

AgroInsurance International would like to thank the remote sensing data and technology service providers sponsoring this survey. Report is made public with the support from:



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www.green-triangle.com – **GreenTriangle** is a platform to digitize the claim adjustment process in crop insurance and to monitor crop conditions remotely. It leverages experts' local knowledge with modern EO and machine learning applications, optimizing field data collection, filling the gap between traditional indemnity and parametric crop insurance, reducing the loss adjustment costs and preventing fraud and providing quantitative historical and real time insights on crop yields at field, regional and national level.



www.skyglyph.com - **Skyglyph** is an insur-tech company, developing a collaborative cloud platform that applies remote sensing and machine learning for crop inspection and risk assessment. Platform analyses images and data from satellites, drones, ground robots, and even smartphones to detect crop condition and possible risk effects.

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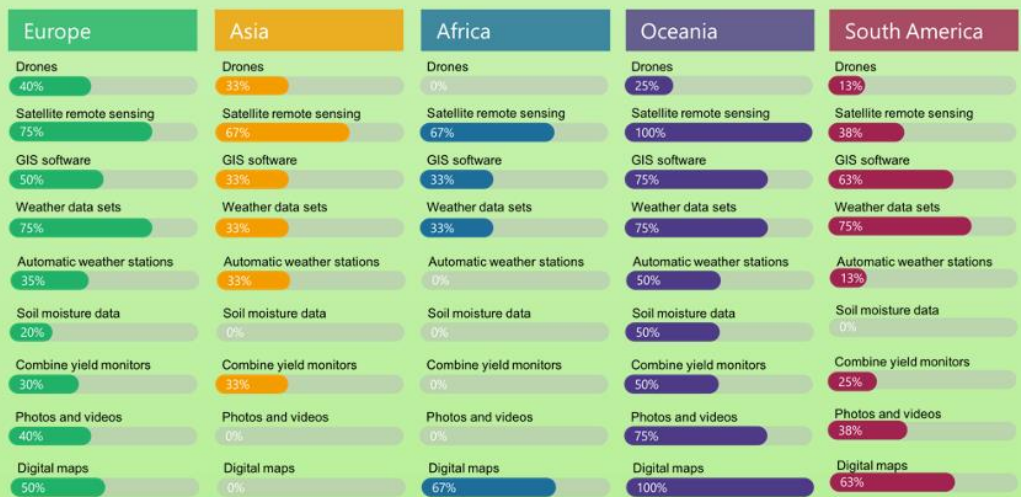
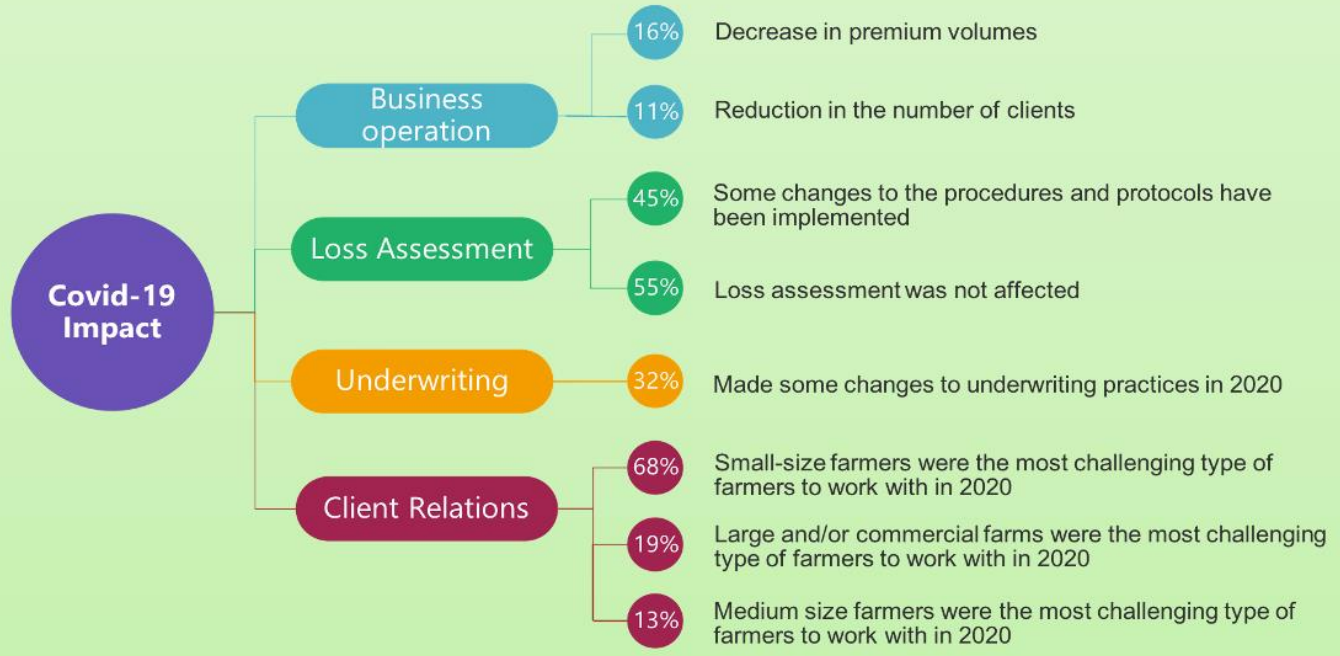
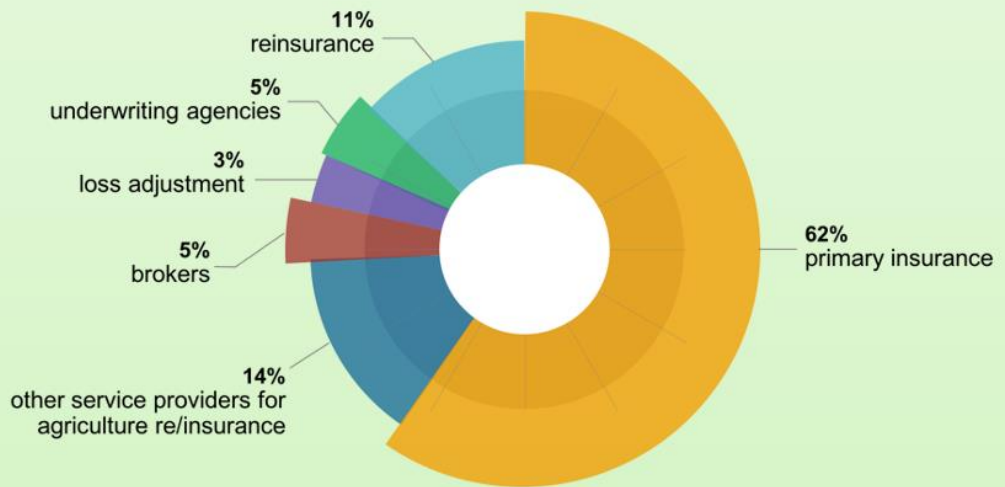
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Report summary

66%
No

Did you experience significant change of business operation?

Industries represented in the survey



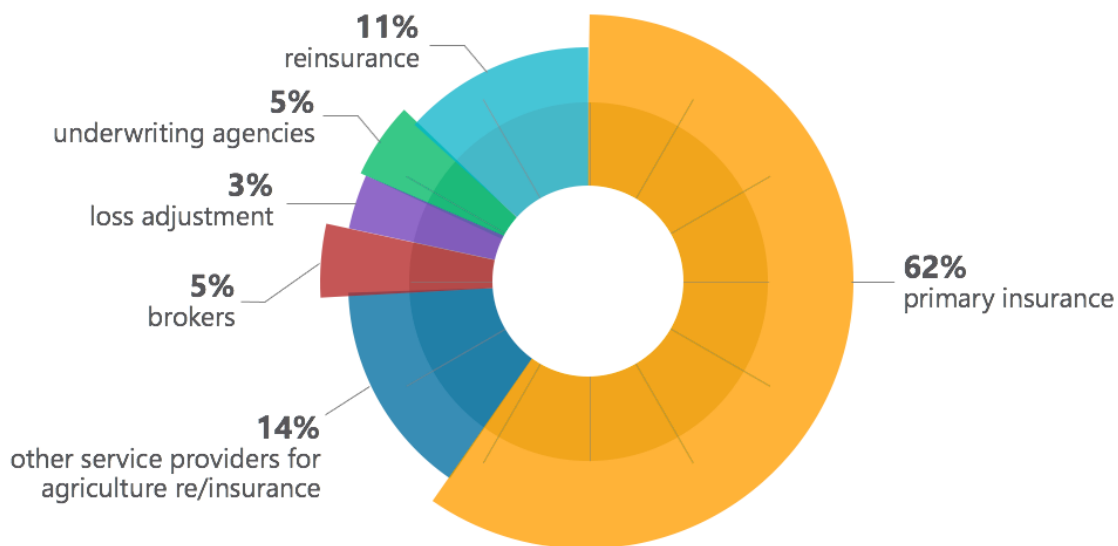
29
countries surveyed

Introduction

AgroInsurance International has conducted a survey on the effects of COVID-19 on the **global agricultural insurance industry**. The purpose of this survey was to understand if agricultural insurers and reinsurers experienced any difficulties while operating their businesses during the COVID-19 outbreak in 2020. Underwriting new business, processing renewals and assessing losses were among the key items in focus during the survey. The AgroInsurance team was also interested to see if any new procedures, protocols or technologies were introduced to support businesses operations under 2020 the challenging circumstances of 2020. This survey was focused exclusively on agricultural insurance (field, oil and technical crops, horticulture, forestry, pasture and forage crops, livestock, aquaculture, greenhouse insurance, weather, yield and other types of index insurance for agriculture). Agroinsurance did not collect information on the COVID-19 impact on other insurance business lines (like farm property or liability insurance).

Online survey participants included 64 respondents from 29 countries. The respondents represented brokers (5% from the total number of respondents), primary insurance (62%) and reinsurance (11%) companies, loss adjustment (3%) and underwriting agencies (5%) agencies, and other service providers for the agriculture re/insurance business (14%).

Graph 1. The agricultural insurance industries represented in the survey



There is strong evidence of a paradigm shift in many countries, with primary insurers dedicating more attention to new technologies and implementing changes to key procedures and protocols. However, in many cases, those processes had been long due already. COVID-19 became an influencing factor, which encouraged insurance companies to focus on new technologies and solutions more seriously. For example, most insurers have recognized that the “working-from-home” approach works well, and management need not be concerned about overall business performance.

In addition to the online survey responses, AgroInsurance has conducted online research and analysis of public sources which have published statements about the impact of COVID-19 on the global agricultural insurance market. Thanks to direct one-on-one communication with selected market experts, more insights have been obtained into the current status of the agricultural insurance industry and its future development prospects. The research findings are summarized in this report.

We have added responses from the survey participants to the report. Direct quotes are shown in italics with unedited wording coming directly from the survey respondents. To get a better feeling of the agricultural insurance industry needs, coming directly from the industry insiders, we have kept direct speech quotes as they were, even with some grammar or spelling mistakes.

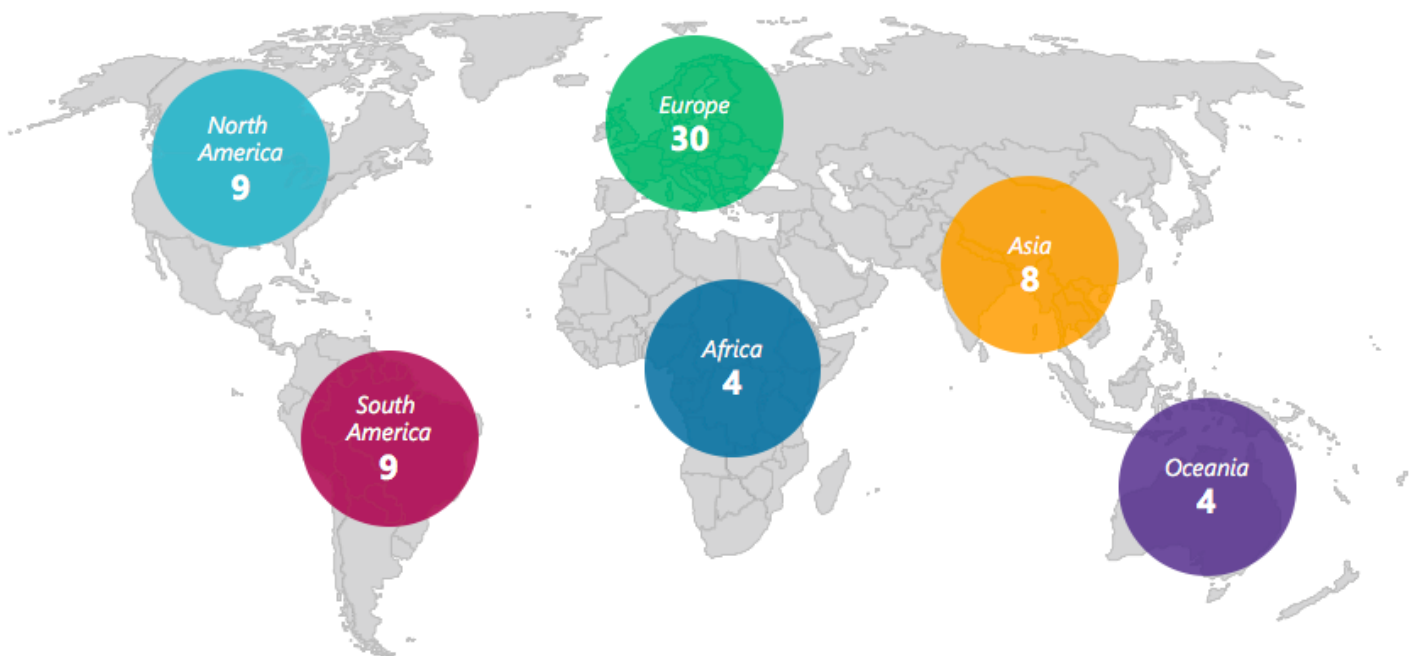
Of all the companies that have contributed to this survey, we are listing just those that expressly agreed to be mentioned in the report, or publicly shared their statements and statistics:

Agribusiness Consulting Group (Australia) – Loss adjustment agency
Topdanmark (Denmark) – Insurance company
Sompo Seguros SA (Brazil) – Insurance company
VanderSat (Netherlands) – Satellite data service provider
Opportunity Microinsurance Development Center (India) – Insurance organization
AEGIS (UK) – Underwriting agency
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JSC Insurance Company GPI Holding (Georgia) – Insurance company
Ministry of Agriculture and Livestock (Ecuador) – Government agency
Vereinigte Hagelversicherung VVaG (Germany) – Insurance company
Munich Re (Germany) – Reinsurance company
Agroseguro (Spain) – Agricultural insurance pool
NFU Mutual (UK) - National Farmers Union Mutual Insurance Society
Agricultural Finance Services Corporation (Canada) – Crown Corporation
Agricorp (Canada) – Crown Corporation
Saskatchewan Crop Insurance Corporation (Canada) – Crown Corporation
Risk Management Agency (USA) – Agricultural insurance program administrator
NAU Country Insurance Company (USA) – Insurance company
Producers Agriculture Insurance Company (USA) – Insurance company
USDA (USA) – Department of agriculture (Ministry of Agriculture)
Country Mutual Insurance Company (USA) – Insurance company
ELGA (Greece) – Agricultural Insurance Organization

Table 1. Countries participated in the Covid-19 survey

Survey responses were received from the following countries:				
Australia	Canada	Greece	Serbia	Uganda
Austria	Denmark	India	South Africa	UK
Argentina	Ecuador	Indonesia	Spain	Ukraine
Armenia	Egypt	Netherlands	Switzerland	USA
Brazil	Germany	Philippines	Thailand	Vietnam
Cambodia	Georgia	Poland	Turkey	

Map 1. The total number of Covid-19 survey participants¹



¹ The number of the participants indicated on the map represents the total number of responses received with the help of the online questionnaire, personal communication and public resources combined

Business Operation

According to the survey results, COVID-19 did not have a significant effect on business operations of the agricultural insurance market overall. Thirty-four percent of respondents indicated that their companies were affected by COVID-19 to some degree. Only 16% of respondents stated that in 2020 their companies experienced some decrease in premium volumes and a reduction in the number of clients (11% of the responses received).

The respondents stated that, in general, the crop and livestock insurance sales season in 2020 developed in a fashion similar to previous years. Surprisingly, the farmers in most countries did not change their strategies due to COVID-19 pandemics. They continued using insurance as a risk management instrument. Farmers continued signing up for agricultural insurance programs or renewed their insurance coverage.

In the selected South-East Asian countries (Indonesia, Vietnam, Cambodia, and Myanmar) some index insurance programs, initially intended for piloting in 2020-2021, were postponed and may resume in 2022. This delay in agricultural insurance pilots is mostly due to insufficient infrastructure and low capacity in these countries rather than to COVID-19. According to the respondents, the crop insurance premium volume and the number of policies in South East Asia were not affected by the rescheduled dates of new program launches.

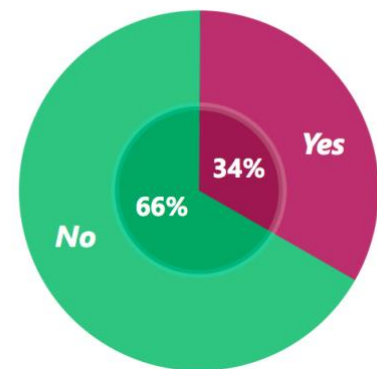
The insurers have confirmed that renewals for existing clients were processed smoothly and in a timely fashion, although in some cases insurers did extend their application deadlines in response to regional travel restrictions, inability to conduct face-to-face meetings and challenging new working arrangements, as many insurance staff members began working from home. New clients' applications were processed remotely via phone, email, fax or web-based platforms.

Reinsurance companies responded to primary insurers in a similar manner. Reinsurers have confirmed that although portfolio managers could no longer conduct on-site meetings with their clients, renewals and new treaties were being concluded on time, with most negotiations being done via emails, web-conferences and phone calls. According to responses from the reinsurance sector, agricultural reinsurance programs suffered minimal impact from COVID-19.

Of significant importance is the fact that the agricultural insurance business was not affected by COVID-19 in countries that have no government subsidies for insurance premiums. This situation is observed in Australia, Ukraine, UK, Germany, Denmark and other countries. However, some difficulties with insurance sales in 2020 were reported by insurers from India, Ecuador, Uganda and Egypt.

According to publicly available information, premium volumes and the number of policies remained stable in many countries. Premium and sum insured volumes were affected primarily by weather and market factors (e.g. reduced prices for some agricultural commodities). For example, in 2020 the agricultural insurance premium of Vereinigte Hagel in Germany constituted 214.8 million EUR² while in 2019 the total premium equaled 212.8 million EUR³. In 2018 the total premium came to 202 million EUR, showing that Vereinigte Hagel insurance company managed to grow its agricultural insurance business in 2020 irrespective of COVID-19 implications.

Did you experience significant change of business operation in 2020?



² <https://www.vereinigte-hagel.net/de/2020/11/ein-rueckblick-auf-das-geschaefts-und-schadenjahr-2020/>

³ https://www.vereinigte-hagel.net/wp-content/uploads/2020/05/Gescha%CC%88ftsbericht-VH-2019_web.pdf

The Risk Management Agency, which administers the subsidized the U.S. agricultural insurance program, reported the total program premium of 10.06 billion USD in 2020, with the premium in 2019 reaching 10.13 billion⁴.

Agroseguro (Spain) has publicly reported a 7%⁵ increase in the number of policies issued with a 47%⁶ increase of total land insured in 2020, when compared to 2019 results.

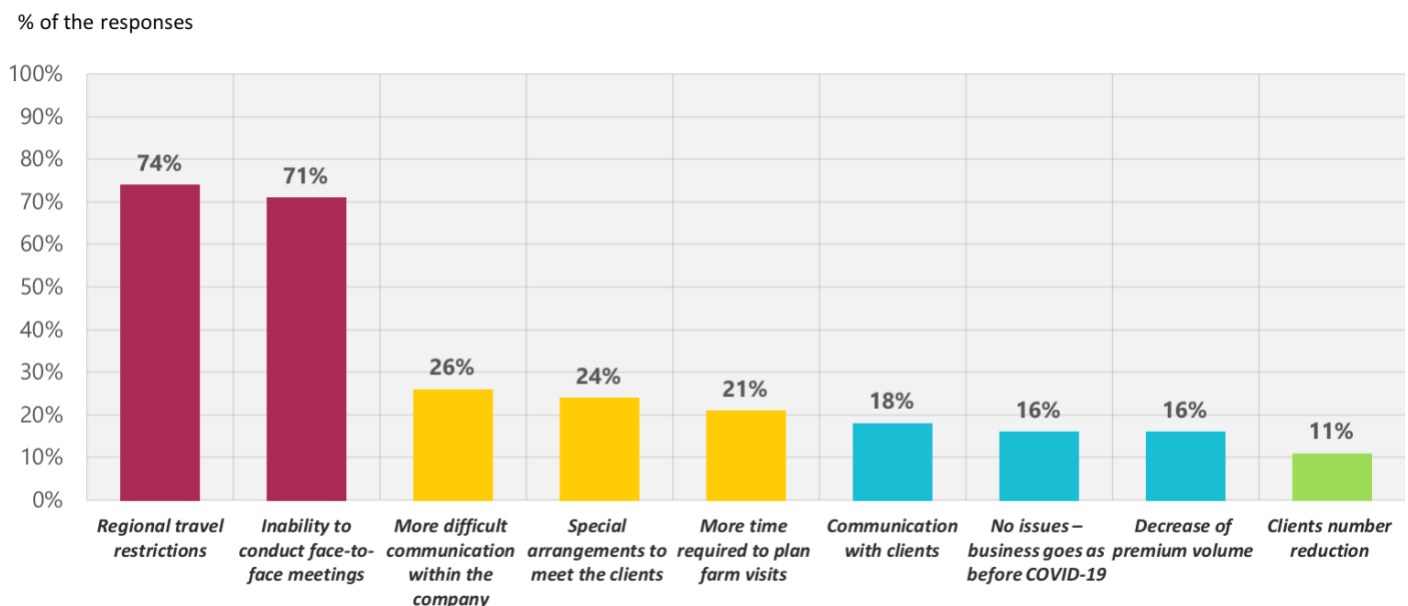
TARSIM, managing the subsidized agricultural insurance program in Turkey, achieved over 20% premium volume increase in 2020 with the total premium sum reaching 2.8 billion TL. This premium growth rate demonstrates that the precautions taken by TARSIM to assure the program's smooth operation in the pandemic situation have succeeded. Respondents from other countries are advising of a similar situation with the agricultural insurance business performance.

The agricultural insurance market in Ukraine performed normally, with the total market agricultural premium reaching 68 million UAH (2.4 million USD) in the first half of 2020. A year-on-year comparison reveals that in the same period of 2019 the agricultural insurance market premium amounted to 54 million UAH⁷ (1.9 million USD).

In India, a number of insurance companies⁸ also reported growth in the crop insurance portfolio, especially in the case of the subsidized crop insurance program.

The pandemic affected the operational regimes of the insurance businesses worldwide, **the most common challenges indicated by 71% of respondents being the inability to conduct face-to-face client meetings and to run business as usual due to the imposed regional travel restrictions (74% of the responses received)**. According to survey participants, insurance companies managed to make quick modifications to their strategies to communicate with farmers remotely. Insurers in many countries had to temporarily close their offices due to COVID-19 restrictions mandated by the governments. However, the insurers timely informed their clients of the way insurance applications for insurance and renewal information were to be submitted and claims to be reported.

Graph 2. Challenges faced during the Covid-19 pandemic



⁴ <https://www.rma.usda.gov/Information-Tools/Summary-of-Business>

⁵ <https://segurosnews.com/news/agroseguro-cerro-octubre-con-un-aumento-en-la-contratacion-de-seguros-agrarios>

⁶ <https://segurosnews.com/news/agroseguro-cerro-octubre-con-un-aumento-en-la-contratacion-de-seguros-agrarios>

⁷ <https://forinsurer.com/ratings/nonlife/20/9/76>

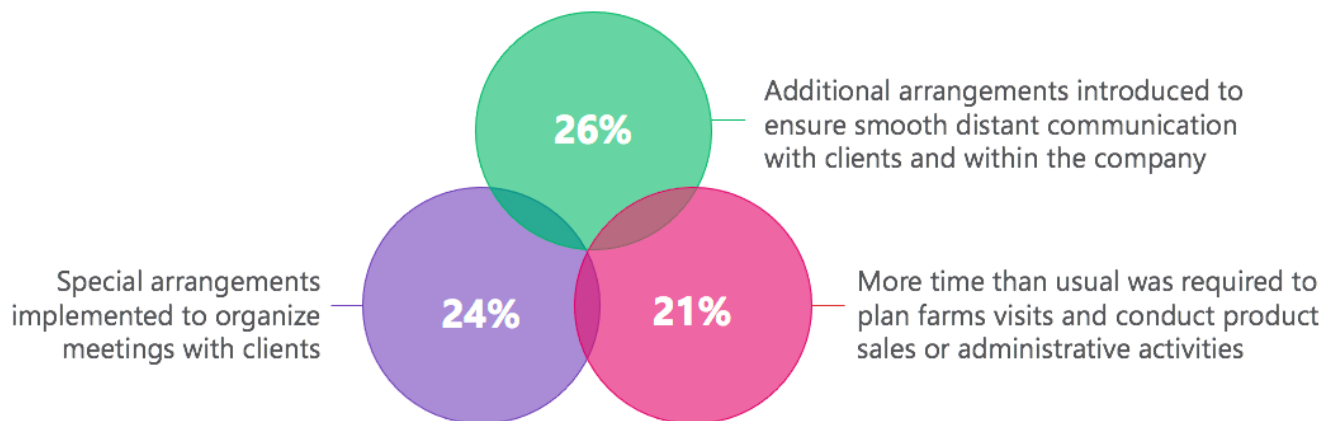
⁸ <https://timesofindia.indiatimes.com/business/india-business/general-insurance-business-at-pre-covid-levels-in-july/articleshow/77582608.cms>

An additional study of online public sources has revealed that administrators of established agricultural insurance programs, such as RMA (USA)⁹, Agroseguro (Spain)¹⁰, AFSC (Canada)¹¹, ELGA(Greece)¹² and others, officially announced that there will be no disruption in service to their clients, while implementing additional mandatory safety protocols for both their clients and in-house staff.

For example, the Risk Management Agency (RMA, USA) responded to challenges facing both the crop insurance industry and farmers / ranchers by introducing additional flexibility terms to support the health and safety of all parties and at the same time ensuring that the Federal Crop Insurance Program continued to serve as a vital risk management tool. The RMA authorized additional arrangements due to COVID-19, such as enabling producers to send notifications and reports electronically, extending the date for submitting production reports and providing additional timeframes and deferring interest on premium and other payments. Similar measures have been introduced practically in all the countries surveyed.

Special arrangements were implemented by 24% of the respondents to organize client meetings. Additional arrangements were put in place by 26% of the respondents to ensure smooth remote communication with clients and internally. Locally imposed travel restrictions were reported by 21% of respondents and consequently it took more time than usual to plan farms visits and conduct product sales or administrative activities (loss adjustment, etc.).

Graph 3. Additional arrangements implemented by the respondent companies due to the COVID-19 situation



The clients, on the other hand, were encouraged to contact their agents, sales representatives or brokers by phone or, if needed, visit local sales offices, schedule a meeting ahead and ensure that safety guidelines were followed.

All USDA¹³ Service Centers remained open, including those that restricted in-person visits or required prior appointments. USDA was using a phased, data-driven approach to determine which Service Centers would remain open for in-person appointments. All Service Center visitors wishing to conduct business with the Farm Service Agency, Natural Resources Conservation Service, or any other Service Center agency were required to book ahead. Service Centers that were open for appointments pre-screened visitors based on health concerns or recent travel. All visitors were required to adhere to social distancing guidelines.

⁹ <https://www.rma.usda.gov/News-Room/Continuing-Interest/Coronavirus-Resources>

¹⁰ <https://agroseguro.es/atencion-al-cliente/covid-19>

¹¹ <https://afsc.ca/news/afsc-adjusts-branch-operations-in-light-of-new-mandatory-health-measures/>

¹² <http://www.elga.gr>

¹³ <https://www.farmers.gov/coronavirus>

In Brazil, Sompo Seguros¹⁴, reinsurers and some underwriting agencies moved 100% of their employees to “home-office work” due to locally imposed social isolation protocols. The companies used digital tools to increase interaction between insurance brokers and policyholders. One respondent noted that the company introduced internal daily calls to support sales and underwriting procedures. This resulted in longer working hours for the staff. Conference calls with farmers were added to the routine procedures for the sales team.

“What at first glance we perceived as operational challenges, showed us that there are other ways to stay close to our customers and partners. And that there are many ways to achieve effectiveness in our business and provide a high-quality service, as if we were physically present.”¹⁵

President of Sompo Seguros, Brazil

Underwriting

According to survey results, 32% of respondents had to make some changes to their underwriting practices in 2020. Some insurers designed and implemented mobile applications, to enable farmers to purchase insurance coverage online or just by contacting the insurer by phone through a dedicated line. The insurers started to use digital signatures more extensively with a “wider use of online portals for logistics of contracts’ documents”. The reinsurers have introduced “COVID-19 specific communicable disease exclusion with specific write-backs depending on Agro line of business”.

Notably, apart from the hard-copy applications as traditionally available, some insurers implemented mobile applications/portals for their own agents, such as the ‘Agent Portal’¹⁶ developed by the NAU Country Insurance Company in the USA. USDA used Microsoft Teams to allow producers to meet with USDA Service Centers’ staff virtually. Step-by-step instructions have been provided to all farmers to install the necessary software to ease communication with insurers and program administrators. Through Box and OneSpan, USDA offered services that made it easier than ever for producers working with government agencies and organizations to conveniently access, sign, and share documents online. These tools did not require any software downloads, as farmers could get started with a simple username and password for Box or with a quick identity verification, in the case of OneSpan.

Policy sales closing and application dates were revised, premium payments and reporting deadlines were extended by most of the insurance program administrators, such as Agroseguro (Spain), RMA¹⁷ (USA), ELGA (Greece)¹⁸, AFSC¹⁹, MASC²⁰, AgriCorp²¹, SCIC²²(the last four are the subsidized crop insurance providers in the Canadian provinces of Alberta, Manitoba, Saskatchewan and Ontario). However, deadline extensions were applied in some cases to selected crop types or certain risks only. For example, as announced by AgriCorp²³ in Canada, coverage options for 2020 and 2021 have not been affected, and program extensions did not cause gaps in coverage, which enabled farmers to keep crop insurance coverage in place, for both

¹⁴ <https://sompo.com.br/presidente-da-sompo-aborda-relacionamento-com-corretores-em-tempos-de-covid-19-no-programa-seguro/#>

¹⁵ <https://sompo.com.br/presidente-da-sompo-aborda-relacionamento-com-corretores-em-tempos-de-covid-19-no-programa-seguro/>

¹⁶ <https://www.naucountry.com/about-us/news/news-detail/2020/10/30/explore-the-agent-portal>

¹⁷ <https://www.rma.usda.gov/News-Room/Frequently-Asked-Questions/COVID-19-Response>

¹⁸ <http://www.elga.gr/nea/96-deite-edo-ola-ta-deltia-typou/827-paratasi-katavolis-tis-eidikis-asfalistikis-eisforas-gia-to-2019-eos-tis-30-septemvriou>

¹⁹ <https://afsc.ca/>

²⁰ <https://www.masc.mb.ca/>

²¹ <https://www.agricorp.com/>

²² <https://www.scic.ca/>

²³ <https://www.agricorp.com/en-ca/News/2020/Pages/PI-MoreTimeToPayPIPremiumsForForageAndFruit.aspx>

subsidized and commercial programs. Similar actions have been introduced by insurers in most of the countries surveyed.

As for livestock farms that met certain pre-determined requirements, access to coverage was allowed without pre-acceptance assessment but by requesting a declaration about the animals' health condition from the insured. We have noticed such an approach was introduced by insurers in North America and Europe.

Due to multiple local lockdowns, pre-acceptance and routine crop surveys were performed using new social/physical distancing protocols. Insurance representatives communicated with farmers using online messengers or mobile phones. Crop surveys were done in 2020 mostly without direct physical contact with the insured or farmer. Crop surveyors/inspectors would survey the crop, send photos and report to the insured. If the property was accepted for insurance and electronically signed, the crop survey would be considered completed. In the case the customer did not agree with the survey outcome, the farmer could come to the field, take his/her photos and discuss the results with the inspector.

Some insurers employed drones for remote crop surveying. Several respondents in Europe have indicated that their companies employed drone-operating companies to help insurers with crop surveys or purchased additional drones to assist their crop surveyors. In 2020 a drone operator needed to get a permission from the farmer by phone to operate a drone at the insured fields and the video and photos were being shared between the insurer and the farmer.

Some insurers applied satellite remote sensing (Canada, Ukraine, Austria, Germany, Australia, Philippines, Thailand, etc.)²⁴ to assess crop condition and to establish the affected areas prior to conducting an in-field inspection. This technology proved to be time-saving and beneficial, as the inspector would know exactly which areas at the given field required more attention.

Drones have certain advantages over the satellite imagery, and this was the case in 2020, as the drone operator could direct a drone to a specific area and take close-up photos, something that was not possible (e.g. due to dense cloud cover) to do with satellites in the real-time mode. Drones were also unaffected by the cloud cover, and this allowed crop inspectors to survey crops even with the dense cloud cover staying over certain regions for days, or even weeks.

At the same time, **satellite imagery became more affordable from the cost perspective**. A number of insurers contracted satellite data providers to assist them with crop inspections and crop condition assessments. The satellites' revisit time has been reduced significantly in the last several years, with more instruments operating on the orbit, which leveraged the usefulness of satellite application versus drones. Notably, often local legislative requirements required drones to be operated by licensed operators to conduct crop surveys, which increases costs. The main challenge with satellite data seems to be the interpretation of data and its practical use for underwriting purposes by insurance specialists. This was the case in 2020, when drones and satellites proved to be valuable technological solutions for agricultural insurers in the COVID-19 circumstances.

Insurers in Europe²⁵ introduced electronic risk acceptance and the electronic binding of contracts (UK). Automatic policy proposals and the revision of sales closing dates were implemented in Turkey. Insurers in Denmark, Austria, Germany and Ukraine started to use satellite data for underwriting more extensively. However, several insurers noted that: (i) the satellite data were still "*not good enough*", (ii) "*data required specific technical skills to interpret it properly*", (iii) "*lack of understanding how the available satellite instruments could be better used for the purposes of agricultural insurance*".

Ukrainian, Serbian and Polish insurers specified that they have modified their procedures for "*crop inspections, if possible, without the participation of additional people and outsiders*".

²⁴ personal communication with the insurance company representatives

²⁵ online survey participants from 12 European countries provided information and feedback

Agricultural insurers in Asia advised that they have “developed mobile app-based proposal and allowed digital transfer of premium” (India, Philippines), used drones more extensively and took a closer look at the satellite data (Thailand, India, Philippines, Indonesia).

The COVID-19 pandemic motivated insurers in Brazil to look “for the new ways to adjust losses”. Several insurance companies and underwriting agencies have introduced 100% digital pre-acceptance inspections for farms in riskier areas. At the same time, the agricultural insurers in Africa commented that they have not been affected from the underwriting perspective (Egypt, South Africa, Uganda). Insurers from Australia highlighted certain changes happening due to the “work from home” regime, which called for certain adjustments to the underwriting process and authorization by company managers. Farm pack policies offered by Australian insurers have been affected due to the government’s embargo on rent defaults for rental houses on farm properties but no issues for crop insurance programs were reported.

One of the comments that AgroInsurance has received was a very detailed response about agricultural insurance companies’ attitude towards the COVID-19 situation. The insurers proved to be socially responsible and attentive to the needs of the farmers:

“Covid-19 leads us to once again remembered that food and agriculture are crucial sectors for every country. All elements in agricultural production and food chain have been identified as critical sectors in our country. Together with the government and local authorities’ decisions, uninterrupted operations are made possible and farmers are allowed to continue their operation without interruption. In addition, necessary precautions are taken to prevent interruption of food chains. We have been following the technological developments in our sector very closely and integrating the eligible innovations into our infrastructure immediately. By taking advantage of the opportunities provided by the technology we continued to provide uninterrupted service to the producers and stakeholders. We called on producers to easily carry out their agricultural insurance transactions without leaving their home.”²⁶

The overall conclusion about the underwriting side of business is that the insurers did not face significant challenges due to the COVID-19 pandemics. As mentioned earlier in this report, most insurers all over the world did not record any significant drops and even experienced an uptick in agricultural insurance business volumes in 2020.

Notwithstanding the challenging underwriting conditions of 2020, the main innovations introduced for underwriting needs in 2020 included a more extensive use of digital solutions for crop monitoring, mobile applications for online premium payments and electronic communication with the insureds.

Loss Assessment

The AgroInsurance team agrees that loss assessment was moderately affected by COVID-19: 55% of respondents advised that loss assessment was not affected, while the remaining **45% responded that some changes to the procedures and protocols have been implemented**. Travel restrictions made communication between parties either totally remote, or additional arrangements were needed for farm visits. In order to perform loss assessment, some companies used the photo-based approach, where clients took photos showing the volume and characteristics of the loss gained and sent it further to the insurance company.

²⁶ Direct quote extracted from the questionnaire provided by the respondent representing the insurance company from Europe

Some companies continued regular onsite visits even during the peak periods of COVID-19. This is mostly the case for those companies that have a well-organized decentralized loss adjustment workforce in the field. To ensure compliance with the quarantine restrictions, in some cases adjusters had to contact authorities to get the required permissions to enable them to travel within the region or cross the borders of the neighboring administrative units for onsite visits and crop inspections (Australia, Ukraine, Turkey, Poland). Respondents from Brazil indicated that *“Field Inspections Contingency Plan to support a huge drought season was implemented and accomplished with less than 1% deviation. All clients with claims were duly assisted”*.

Regarding loss assessment procedures, Agroseguro (Spain) introduced a new video-adjustment procedure to reduce visits to the farms during the lockdown. These virtual loss adjustments are done by means of specific software. **At the time of the loss adjustment, the farmer receives a link to connect to the virtual application with his mobile phone from the farm.** It works similarly to a video call, and the adjuster can guide the producer along the farm to evaluate the damages. It is possible to take high resolution pictures. According to Agroseguro²⁷, claims management and indemnity payouts were carried out in full in 2020.

In the USA²⁸ all field work, including conservation planning assistance, remained fully operational with appropriate social distancing.

Indemnity payouts, as reported by various insurers (Spain²⁹, Greece³⁰, Australia, Ukraine, Canada, Turkey, etc.) were performed in a timely manner. The farmers could submit claim notifications by phone or email.

In the UK, the National Farmers Union Mutual (NFU Mutual) also did not suffer from any procedural interruptions for crop inspections³¹. Nevertheless, additional precautions were taken when a loss adjuster came in contact with an infected individual, was tracked via “Test and Trace” and needed to self-isolate. Client appointments were often cancelled or rescheduled in such cases.

In Canada, Agriculture Financial Services Corporation (AFSC, Alberta)³² provided its inspectors with safety kits including gloves and hand sanitizers for use while on-site. In addition, all AFSC employees were encouraged to apply appropriate hygiene practices, i.e. clean and sanitize work areas regularly, be it a desk, a truck or electronic devices used. Additionally, AFSC conducted onsite visits only when clients were comfortable with completing the inspection. This included situations where clients were present at a safe distance from AFSC staff or when a client allowed AFSC to inspect while the client was not present on-site. Some low-risk claims were approved by AFSC without a physical crop inspection, while it encouraged its inspectors to meet clients at the inspection sites, following safety protocols. The Saskatchewan Crop Insurance Corporation (SCIC) recommended its staff to complete field inspections alone and not to enter the client’s home or buildings on client’s property, thus maintaining social distancing.

ELGA³³ in Greece performed on-site inspections, predominantly only in cases of large damage, which needed an immediate assessment and settlement of the claim.

In cases of on-site visits, the following social distancing measures were usually followed:

- During crop assessment, the adjusters and clients were instructed to drive to and from the selected fields separately – each using their own vehicle and once on-site, both maintained physical distancing protocols;
- Fields of the insured who preferred not to be physically present during the survey were detected using GPS coordinates. Producers were informed by phone about loss adjustment observations and survey results;
- Once the inspection was completed, inspectors emailed a copy of the inspection report to the client to review and sign off.

²⁷ <https://agroseguro.es/atencion-al-cliente/covid-19>

²⁸ <https://www.farmers.gov/coronavirus>

²⁹ <https://agroseguro.es/atencion-al-cliente/covid-19>

³⁰ <http://www.elga.gr/nea/96-deite-edo-ola-ta-deltia-typou/818-o-elga-stirizei-tin-agrotiki-koinonia>

³¹ https://www.nfumutual.co.uk/about-us/coronavirus/farming-insurance/#could_covid_19_cause_inspections_to_be_cancelled

³² <https://afsc.ca/resources/enhanced-on-farm-inspection-procedures-help-keep-producers-safe-during-covid-19/>

³³ <http://www.elga.gr/nea/96-deite-edo-ola-ta-deltia-typou/818-o-elga-stirizei-tin-agrotiki-koinonia>

Respondents from Europe gave the following feedback on the loss assessment questions: (a) *“It is slightly difficult to make loss assessment when you have to wait to visit the customer due to Covid-19 restrictions”* (Denmark); (b) Recommendations with regard to hygiene measures (distance, protection, single person adjustment, work in the home region to avoid travels) (Germany); (c) Bring field assessment in line with Covid-19 restrictions (Switzerland); (d) There is a special procedure for applying protective measures during loss assessment in the field to maintain the highest possible safety standards for our customers, partners and employees. Remote sales of insurance products were introduced. Special sanitary conditions were applied during loss assessment as little contact with the claimant as possible, Faster decision making (Poland, multiple respondents).

Respondents from India advised they implemented *“picture based loss assessment”*, but in case of index-based insurance they had *“no issues with loss assessment and claims payments”*. They also commented that *“claims were being approved through email instead of traditionally on paper”*.

Similarly to other regions, African insurers were only mildly affected by COVID-19. The key challenges for loss assessment were: (a) remote work (Egypt) and (b) *“due to lock-down conditions, pre-acceptance surveys are being done remotely through discussions and getting information”* (Uganda). It was also reported that large-scale training programs and conferences, including regular regional programs for loss adjusters, were cancelled.

A surprising finding for the survey team was that the insurers did not mention using drones or satellite data for loss assessment. The possible reasons may be that some insurers have been applying drones for loss assessment for some time already and they are no longer considered to be an ‘innovation’. Satellite data are being used for loss assessment by some insurance companies, but such technology is still not very commonly used on the global market. This issue is addressed later in this report in the ‘Technology Implementation’ section. According to personal communication with the selected insurers and loss assessors, drones are already being used for crop inspections and loss assessments in France, Germany, Ukraine, Turkey, Australia, Indonesia and some other countries.

Client Relations

According to the survey responses, the most challenging type of farmers to work with in 2020 was small/individual farmers (68% of the responses received), followed by large and/or commercial farms (19%), while medium size farmers were indicated to be less challenging, totaling 13% of responses. One challenge that stood out particularly in regard to interaction with small farmers was the fact that the coordination of numerous online meetings seemed to be overwhelmingly time-consuming.

USDA³⁴ used Microsoft Teams to enable producers to meet with USDA Service Center staff virtually. Through Box and OneSpan, USDA now offers services that make it easier for producers working with the Farm Service Agency or the Natural Resources Conservation Service to conveniently access, sign, and share documents online.

Additionally, a number of insurers designed or switched to full-time online portals/accounts where producers can go online to pay premiums, report losses, check their coverage details, receive weather notifications and review claim status at any time.

In general, the most common challenge experienced by the majority respondents with every type of farmers was the planning of on-site visits. It has also been noted that due to local lockdowns and restrictions, some farmers missed an opportunity to update their yield records.

³⁴ <https://www.farmers.gov/coronavirus>

Most insurers in Europe responded that small/individual farmers were the most challenging group to work with in 2020 (Switzerland, Germany, Denmark, Netherlands, UK, Turkey, Poland, Georgia). Mostly this was because of the additional arrangements that were required in order to contact farm managers and arrange farm visits for crop inspections and loss assessment. **High administrative costs (sales and loss adjustment), lacking financial liquidity and risk awareness, basis risks for index-based solutions, the high diversity of crops on a single farm, low adoption of technology and insufficient web connectivity were mentioned as additional challenges for insurers working with small farmers.** Similar responses on working with small/individual farmers were provided by respondents from the South American countries (Brazil, Argentina, Ecuador). These respondents indicated that smallholder farmers have “*little insurance culture, which translates into a low penetration of agricultural insurance*”.

Some insurers indicated that “*large farms are easier to make a meeting online and assess the risk later but with small farms it is quite a challenge to coordinate all the "small" meetings*”. “*Time to explain our new product*” to small farmers was another challenge for insurers who launched new insurance solutions in 2020. However, Swiss insurers said the following about large farms: “*Large farms are often complex and need more advice, consulting*”. We attribute this feedback to the specifics of the Swiss agricultural sector. Similar feedback was provided by the insurers from Brazil. According to them, large commercial farms required more time and resources for crop surveys and loss assessment. The insurance specialists had to take long trips to large farms, which is a distinctive characteristic feature of the Brazilian agriculture as a lot of large farms are located far from the cities. “*Due to lack of hotels and the restaurants closed, large farms demanded more work*”. Larger farms also demanded “*larger teams of agronomists and more time to assess the claims. No hotels nearby, neither restaurants.*”

“The management of an insurance policy for a large farm is, in general, more complex than for a small one. This is mainly due to the number of plots, geographical dispersion, capital in risk, claims, etc.”

Insurers in Asian countries advised that small farmers required more time and resources in order to communicate, explain how insurance coverage works, and arrange crop inspections and loss assessments. “*Loss assessment was hampered due to restrictions on movement*” was another comment by the survey respondents (India, Indonesia).

Feedback from African insurers was mixed. Insurers from Uganda and South Africa reported that small farmers were more challenging to work with due to the “*nature of farming practices*” and because “*organising the farmers is a difficult process*”. Totally different feedback was received from Egypt. The insurers commented that large and commercial farms were more difficult to work with due to “*communication and planning*”.

Mixed feedback came from Australia as well. Insurers advised that “*value adding face to face communication*” is important for all types of farmers. Though large and commercial farms required “*higher discounting for large growers*”. Availability of capacity for large forestry accounts was also a challenge in 2020. Medium-sized farmers are the backbone of the agricultural insurance sector in Australia; however, “*visibility, underinsurance and anti-selection*” were the main issues for insurers offering cover to medium-sized farmers.

While planning this survey and working on the questionnaire, AgroInsurance acknowledged that **the definition of a small-sized farm for insurance purposes is not universal**, as in various countries a “small-sized farm” may be defined differently. We asked the participants to explain which criteria they apply when defining farm size. When defining the size of a farm, **the area under production is the most commonly used criterion in the majority of the countries surveyed**, as reported by the survey respondents. Additional indicators, which may also be applied, are **the number of employees and the farm’s annual turnover**. For example, Spanish insurers define a ‘small farm’ as a farm with an annual turnover of less than 50,000 EUR, while the turnover of a ‘medium-sized farm’ may reach 200,000 EUR per year. **The number of**

insured animal units at the farm may also be applied when differentiating between livestock farms of various sizes.

Interestingly, there is no common definition of a small farm in European countries, as advised by the insurers from this region. **Below are the criteria of a small farm applied by insurers in different EU countries**, which is based mostly on the size of arable land:

Denmark - < 250 hectares and <150 animal units at the farm per year

Germany - < 50 hectares

Georgia - < 5 hectares

Poland - < 50 hectares but the definition depends on the type of the insurance product. In the case of crop insurance, farms are divided into small and large by area.

Switzerland - < 1 hectare

Turkey - < 6 hectares

In Asian countries most farmers are very small. In India a farm is considered to be small if the area is less than 1 hectare. The farm is considered large if the area is bigger than 2.5 ha. Small farms in Indonesia are even smaller than in India, and a farm is considered small if the farmer cultivates less than 0.5 ha. In Vietnam farmers cultivate crops on very small plots of land as well, with an average land plot being around 0.4 ha³⁵. Meanwhile in the Philippines, smallholders cultivate on less than 3 ha³⁶. Thai small households have less than 1.6³⁷ ha of land.

In South America, the insurers consider a farm small, from the insurance perspective, if its area is less than 100 hectares. Medium-sized farms are up to 1,000 hectares. Insurers use additional criteria for segmenting farms into small, medium and large ones based on annual turnover, the number of employees, the number of crops produced and even the amount of subsidy a particular farm receives from the government.

We did not receive specified indicators for small farms as defined by the local insurers in African countries. The only data available are for Uganda, with a small farm defined with less than 5 hectares, medium being above 5 ha to 30 ha and the farms with more than 30 ha of land being defined as large ones.

Feedback from Australia was noteworthy. Some insurers consider a farm to be small if the farm's area is less than 300 ha, however other insurers define small farms as those with less than 1,000 ha. Additionally, Australian insurers use the premium as a qualification factor with small farms paying less than 5,000 AUD per year, medium - less than 50,000 and large - paying over 50,000 AUD of premium per insurance contract per year.

Technology Implementation

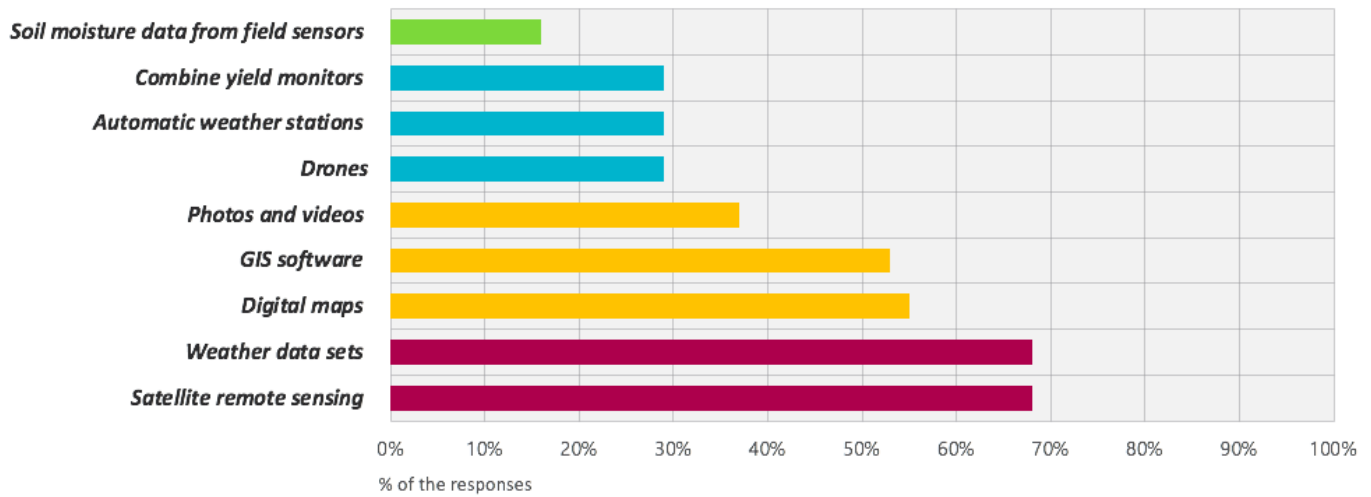
Survey respondents indicated that technologies applied for underwriting and loss assessment during the 2020 pandemic mostly included: i) satellite remote sensing (68% of responses) and ii) weather data sets (68% of the responses), followed by digital maps (55%) and GIS software (53%). Some companies accepted and applied photos and videos provided by the insureds during loss assessment (37%); drones were also more frequently applied (29%). Weather data from automatic weather stations (29%), data from combine yield monitors (29%) and soil moisture data from field sensors (16%) were applied as well.

³⁵ FAO, 2018, Small family farms country factsheet - <http://www.fao.org/3/I8358EN/I8358en.pdf>

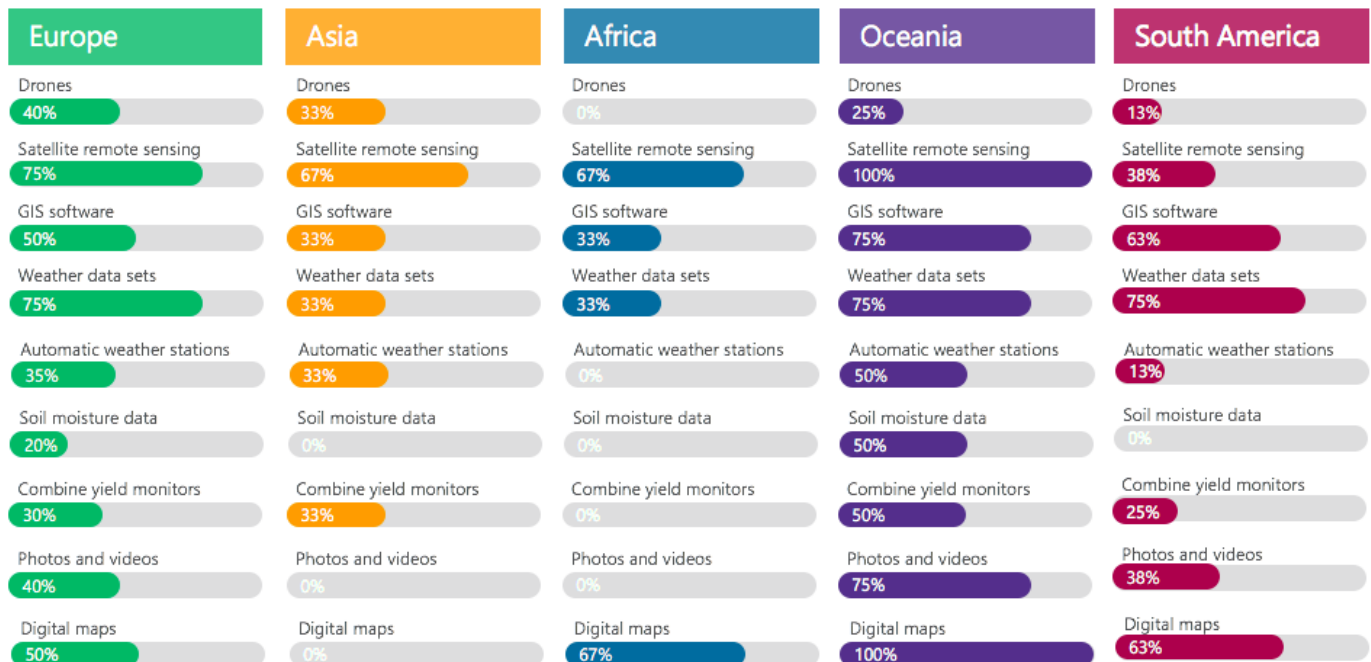
³⁶ <https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0379257>

³⁷ https://www.pier.or.th/wp-content/uploads/2019/09/paper2_paper_Sommarat-Jirath-Phumsit-Witsanu-Kannika.pdf

Graph 4. Technologies applied in 2020 by type



Graph 5. Technologies³⁸ applied in 2020 by region



According to the data received, 75% of the respondents from Europe indicated that their companies routinely use satellite remote sensing and weather data. Interestingly, only 35% of respondents use weather data from automatic weather stations which indicates that the companies are satisfied with the quality of official weather data and digital weather data sets (re-analysed, synthetic weather data provided by the weather companies based on processing satellite data using various algorithms). Only 50% of the respondents use GIS software and digital maps for insurance purposes. AgroInsurance is aware of challenges facing European insurers in collecting field location data from farmers in most countries of the region. This may be the main reason why GIS capabilities are only being used to a limited extent by the insurers in Europe.

Only about 40% of the surveyed companies in Europe use drones in their workflow, which is somewhat surprising as drones have proved to be highly effective for crop condition assessments and field monitoring.

³⁸ The technologies used in North America were not reviewed in the current research

Another interesting finding is that only a handful of insurers use soil moisture data and data from the harvesters' yield monitors.

It is difficult to assess of the extent to which new technologies are used by insurers in other regions of the world within the scope of this survey. This is mainly due to the limited number of responses from Africa, Asia, South America and Oceania. However, the African respondents indicated that satellite data are already being used by the insurers.

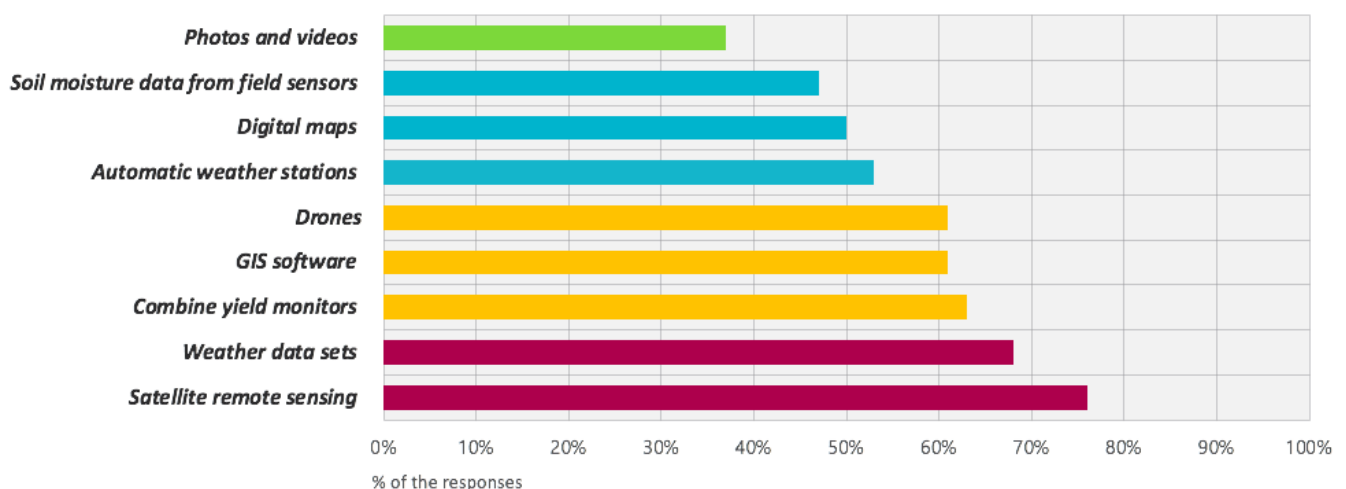
Insurers from South America responded that they use weather data, digital map and GIS software for their agricultural insurance programs. Only 38% of respondents from this region apply satellite data in their work. AgroInsurance is aware of several projects in Brazil, Argentina and Mexico which pilot satellite-based solutions for agricultural insurance needs. However, according to survey respondents, these initiatives seem to be still in early stages.

The respondents from Australia indicated that they apply satellite data, digital maps, and GIS software for their agricultural programs. Drones are being used just by one respondent from the region: a loss adjustment company, which highlighted certain challenges present in Australia. Mostly, these challenges are due to very large farm areas and long travel distances required for drone operators to visit farms and conduct proper assessments.

AgroInsurance is aware about initiatives to use drones, satellite and weather data in Asia for agricultural insurance needs. Several weather index programs were piloted in Cambodia, Thailand, Indonesia, India and other countries, while all index programs are still in the pilot stage. RIICE project was active in several countries in South Asia, but it is still too early to assess this project's success as their data are being used mainly in Philippines for the purposes of rice production monitoring but not insurance. The possible reason for such limited application of the available rice yield data is that the existing data are limited in continuity and the actual level of the assessed yield estimations to the actual ones, which presents the potential level of the basis risk that limits data application for the agricultural insurance purposes.

The survey included a question about new technologies that the insurers think should be implemented in future to enhance agricultural insurance programs. According to the respondents, satellite remote sensing is the most needed one, with 76% of survey respondents choosing this answer. Other new technologies and data include: weather data (68%), data from harvesters' yield monitors (63%), drones (61%) and real-time data from automatic weather stations (53%). Additionally, the respondents indicated that digital maps, GIS software, soil moisture data from field sensors, photos and videos by clients may also be considered as useful tools in future agricultural insurance operations. About 50% of the respondents indicated the potential usefulness of these new technologies and data types for future agriculture insurance needs.

Graph 6. Technologies considered for future use in agricultural insurance



Agroinsurance maintains working relations with several remote sensing data and satellite technology providers, observing that the penetration of these technologies is still hampered by numerous factors. Remote sensing data and analytics were piloted in many countries: Germany, Austria, Turkey, Spain, France, Ukraine, Latvia, Russia, Kazakhstan, Thailand, Indonesia, Philippines, India, Australia, etc. However, the application of earth observation technologies for agricultural insurance purposes is still rather limited.

Agroinsurance experts apply satellite data and technology solutions for underwriting and loss assessment needs in our practical activities, and we are confident that the vast potential of remote sensing technologies application in agricultural insurance is still being significantly overlooked and underused. Vegetation and weather data (both historical and actual) help underwriters to make better decisions on risk acceptance (or rejection) while assessing risks when crop performance in a given year is compared with the previous year's performance. Such data allow underwriters to price risks more accurately and identify possible issues early on before they become critical. Satellite data allow loss adjustors to better plan their inspections, which in our cases proved to save up to 40% of the time required for field inspections.

Agroinsurance assumes that COVID-19 may become a high-influence factor for the wider use of drones and satellites for the needs of agricultural insurance in the nearest future. The following key factors are to be considered in regard to technology use in agriculture insurance:

Requirements for drones:

- A longer flight life for small size drones;
- A wider application of long-range drones for crop inspections to save resources on visiting remote farms;
- Further enhancement of equipment loaded to drones;
- Development of specialized platforms to analyze drone data in real-time and a swift delivery of tailor-designed reports to the insurers.

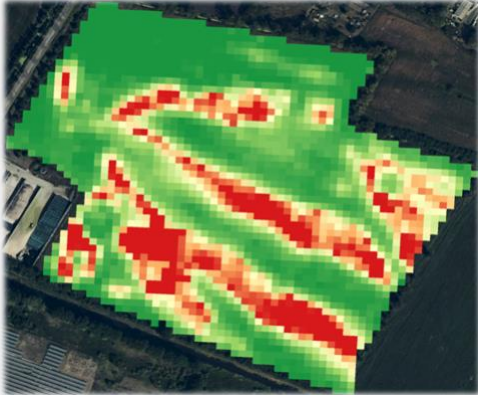
Requirements for satellites:

- Increased re-visit times for new satellites and satellite constellations;
- Higher numbers of satellites on orbit including specialized agricultural large and micro satellites;
- Further development of equipment installed at the satellites with enhanced resolution and more specific data delivered quickly to the end users;
- Adjustable platforms with specialized solutions for agricultural insurers (underwriting and loss adjustment), which can be integrated into the insurers management information systems;
- Enhanced solutions for agricultural insurance including crop identification, yield assessment, livestock tracking, property inspection, etc.

Virtual Crop Inspection - Technology and practical case by Skyglyph

Agricultural insurance industry specialists are facing game-changing conditions while operating crop insurance business within the limits created by the COVID-19 pandemic. Loss adjusters often could not visit clients to assess crops after loss events due to lockdown requirements. To enable business continuation, Skyglyph proposed a cloud-based solution that allows making virtual inspections of clients' fields and assets by using the remote technology: Virtual Crop Inspection.

This product is cutting-edge technology in remote sensing, making a fusion of satellite remote sensing data and low altitude aerial survey information from drones.



In many cases, the precision of high-resolution commercial satellites can validate assets and help to better understand the claim without a field visit.

Satellite-based Normalized Difference Water Index map (left) shows the damage of corn caused by flooding. Red zones indicate flooded areas which constitute 29.3% of the total area of the field.

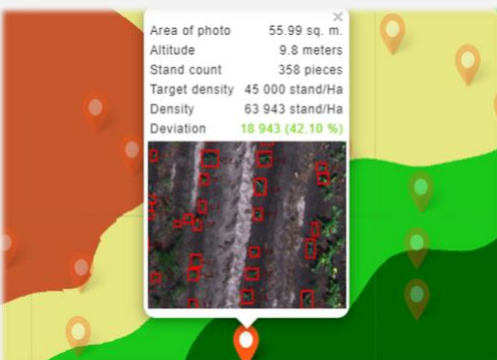
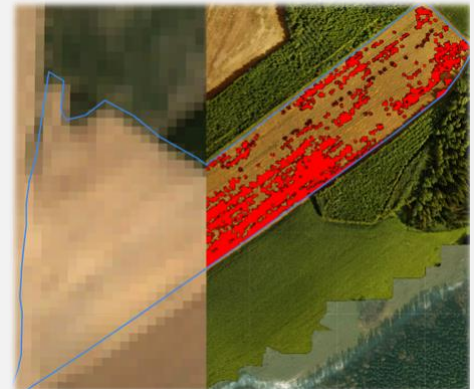
The damage extent was detected without visiting the field and helped the insurer to save on expert time and travel expenses. The loss estimation was done accurately based on the satellite data.

Only a part of the damage can be detected by satellites. Initially, the satellite-based map was generated for water-flooded winter wheat field (right part of the picture) which did not show the logged zones due to the late growth stage.

The damage from the excessive moisture to winter wheat at the ripening growth stage was detected on the map, based on the data collected by the drone (left part of the picture) for an insurance company.

Image segmentation report (left part of the picture) highlighted by red colour the logged area at 32.5% of the total area of the field.

The drone inspection mission took less than 1 hour for data collection and a map was provided to the insurance company the next day after a field visit.



The early crop growth stage is a real problem for satellites and vegetation indices. This case shows an assessment of winter rapeseed in spring after vegetation renewal in response to a claim call from a farmer about more than 70% damage.

A Crop Density Map was generated based on low-altitude photos from the drone as a result of stands counting interpolation on the early growth stage of corn.

The drone data identified 42.6% of the field area (red and brown zones) with the plant count below the required crop stand density.

Such an approach allows the insurance company to assess the renewing of rapeseed vegetation very precisely and quickly. Compensation was paid for only 42.6% of the damaged area.

To learn more about Skyglyph services, contact office@skyglyph.com

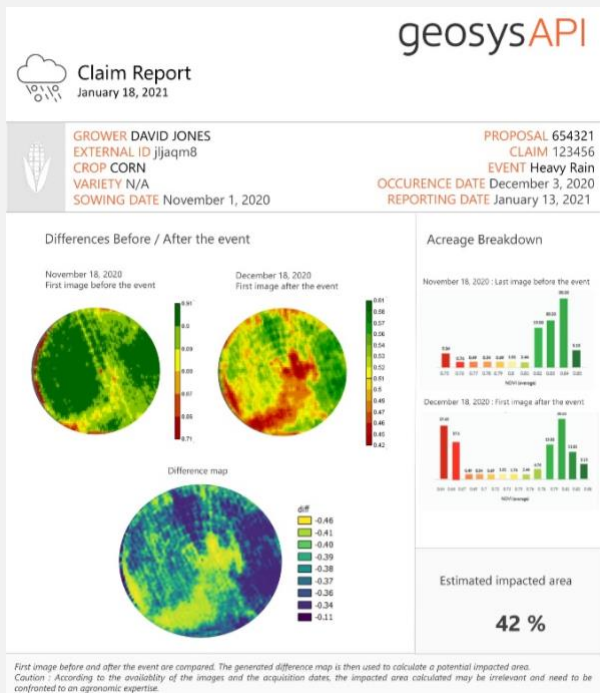
Remote Sensing Analytics Powering the Insurance Workflow in Brazil by Geosys

The COVID-19 pandemic has certainly made it more difficult to travel this past year. With that comes increasing difficulties to get a clear, trustworthy view of what is happening across the expanses of an insurance company’s agriculture portfolio. Fortunately, remote sensing’s ability to provide timely, unbiased, and cost-effective answers has not changed. At Geosys, we manage analytics ready data at every level from country to intra-field that is available for the current season as well as many years into the past. This foundational dataset allows us to deliver analytics which provide answers in many steps of the agricultural insurance workflow.



Two of our best real-world use cases from the past year came out of Brazil. Geosys’s analytics were integrated as key components of the underwriting process. When a grower requests coverage, analytics are run on the farm to determine compliance with guidelines related to previous production history, total farmable land, and environmental requirements. With this information our client can preapprove certain coverages without the requirement of an in-person visit.

This speed has been key to their success with customer acquisition in a very competitive and growing market.



Claims management has been a major consumer of our analytics for this Brazilian client. We provide answers for our customers when validating crop planting conditions and a farm’s adherence with requirements of their policy. Claims reports automatically generate unbiased information about the farm after an event as well as the conditions since the start of the season. Managing the first step of the claims process from the office has been a game changer in speed and efficiency when settling claims. Shortening the time from claim to pay-out has led to increased customer retention figures as well as a great selling point for new customers.

These are just two examples of how Geosys analytics are integrated in our customers workflow.

To learn more about assistance with underwriting, claims management, policy design, in season risk monitoring and harvest validation, contact sales@geosys.com

GreenTriangle: Augmenting the reality of field surveyors for increased profits

Do you think we are using full potential of new technologies in the agriculture loss adjustment process? Many of us do think that digitalization, satellite data and computer science can offer more to the agriculture insurance industry, in particular during the critical exercise of field surveys. In this domain, Covid-19 constraints increased challenges already known in this industry: high traveling costs, consistency of crop yield measures, data storage and security and on some occasion, undetected fraud cases.

A recent study of NASA Harvest – the Consortium commissioned by NASA on food security – in Ukraine demonstrated that a combination of digitalization of field surveys and satellite data gathered via GreenTriangle's platform could reduce loss adjustment costs by 27%. If we add fraud and abuse control, estimated around 4.4%³⁹ of the total loss costs, the insurance agriculture industry could save up to USD 1.5 billions by leveraging full potential of digitalization and new datasets. A net increased profit of 5.3% compared to the status quo!

In 2020, Green Triangle launched several programs with major agriculture insurance players to digitize the loss adjustment process.



Figure 1: Countries where GreenTriangle's mobile app is currently used (France, Italy, Poland, Ukraine, Belgium, South Africa, Uruguay)



Figure: Field clustering to optimize the location of yield samples, accessed via the mobile application (also available in offline mode)

The below details the experience of one of these programs conducted in France. 32 professional field surveyors were equipped with GreenTriangle technology on three sub-portfolios totaling 16,000 hectares. Portfolios were constituted of wheat, rapeseed, barley corn, sunflower and soybeans. The core of GreenTriangle technology is a mobile application that provides near real-time access to satellite data, while prospecting a field. Through the app, the professionals can access following information that supports his field work: (i) estimated yield at field level, (ii) clustering of inspected field into low/medium/high yield zones, (iii) quantified comparison between field plots and (iv) history of yield formation from previous month to previous years, included perils and events that might have affected the crop. Yield. In addition, the app allows to digitally associate a field plot to a policy holder, and to ingest data (policy number, yield level, pictures and more) in both online and offline mode. The data collected via the app is instantaneously stored on a cloud database and accessible continuously via a web platform.

Modelled yield estimates at field level permitted to adjust some claims remotely whereas intra-field clustering reduced the number of necessary samples while significantly improving the representativity of the individual crop cuts. Furthermore, plot yield comparison, field timeline and peril identification modules served to adjust claims more precisely and detect and document five fraud cases, four of them remotely, due to Covid-19 restrictions (quarantine of the field surveyor). It allowed the insurance company to save more than 90,000 EUR on a particular contract and to avoid several court cases.

In addition to these direct benefits, the digitalization of field work improved transparency and trust between the different actors of the insurance business: farmers, loss adjusters and insurers.

Covid-19 travel restrictions and social distancing increased the well-known challenges inherent to crop survey. For this reason, it is critical to support their work with modern technologies. Research and practice have now proven that digital transformation will bring financial and social benefits to agriculture insurance business. The mission of Green Triangle is to provide live access to all relevant data that can augment and improve the reality of those getting to the fields, facilitating their work while increasing profits for all actors in the agriculture insurance value chain. **To learn more about GreenTriangle services, contact info@green-triangle.com**



Figure: Field level modelled yield of 8 wheat field (harvest 2020) in France

³⁹ The US government accountability office estimated fraud and abuse related losses to US 160m out of 3.6b total losses in crop insurance representing a 4.4% share. Source: <https://www.gao.gov/products/GAO-05-528>

General Recommendations and Comments Received

Most respondents have indicated that the underwriting and loss assessment may be further improved by implementing the following in the future (the below responses have been provided by the survey participants):

- i) enhancing the digitalization of processes and protocols;
- ii) a wider availability of mobile solutions for agricultural insurance, including premium payments from a mobile phone account, delivering specific information to the insured farmers, weather and risk event alerts, claim notifications and claim payments;
- iii) ramping up the use of new technologies, such as satellite imagery, drones and application of AI;
- iv) meteorological data should be enhanced and guaranteed to assure the uninterrupted flow of the business in force majeure situations, like COVID-19.

It is also expected the administrative processes will become better automated and more efficient.

When asked about approaches to consider for the future, survey participants mentioned the following:

- automation tools and enhanced application of mobile technologies and specially designed apps;
- crop loss estimation to be done through aggregation and digital crop analytics using agrometeorological data, soil data and available yield statistics applied;
- trustful, consistent and transparent data to be applied (weather data, loss history, etc.);
- application of more granular, geo-referenced and calibrated satellite data.

The respondents from Europe highlighted the importance of remote sensing applications for loss surveys:



"Regardless of COVID-19 pandemic, the goal is to permanently adapt the insurance products and services to the needs of producers. The development of new technologies will contribute to a faster and more efficient management of insurance policies, what can revert also in a reduction of management costs. The use of these technologies will also help to improve the efficiency of the loss assessment procedures, by providing additional tools for early loss estimations, identification of the insured goods, etc."

Feedback from Asia was to encourage the implementation of “a remotely managed mechanism as it is a big subject which needs discussion based on product”. The insurers require “monitoring systems on risk management” and they indicated that “use of technology is essential for assessment of losses”.

The responders from Africa advised that they need to “revise the supply chain and effect on sales”. They would also require “more training” and “more technology in loss assessment/s”.

Australian insurers highlighted the following: “[we] need remote activities that are reliable and accurate”, “need to accurately assess the proximity of forest plantations to bushland”, “accurate identification of situation” and “less input from intermediaries and customers and more AI pre-population of information to ensure data accuracy”.

The responses from South America were extensive, including that they need: “more agile the system and the Teams are to support changes, the best. Changes in training people and investment on system agility”, “investments in remote monitoring technologies (ex. satellites)”, “greater efficiency in the inspection visits made by the Insurance Company”, “Development and use of new technologies (use of satellite images, AI-Artificial Intelligence). Generally speaking, New tools to reduce manual process and analysis”, “improve our technological solution., particularly for loss assessments”, and “Underwriting - digital and mapped underwriting process in those insurers with scarce or weak implementation. Loss Assessment – digital process and satellite support for adjuster (satellite imageries, drones, etc.)”.

The last question in the survey was about the information and instruments insurers actually need to assist them in the future, including underwriting, portfolio management, loss assessment, claim management, client communication, client education and other agricultural insurance procedures and activities. Shown below are the original answers as received from the respondents, because we understand this information may be very important for companies and organizations offering various services to agricultural insurers, reinsurers, brokers, underwriting and loss adjustment agencies.

Asia	<p>“Need a piloting project to implement how remote sensing technology may support in the insurance business”</p>		<p>“Need to use technology to assess losses due to huge number of intimations”</p>	<p>“Applications which are geo tag enabled and mobile based”</p>
South America	<p>“The offer of new technologies is increasing day-by-day and should be carefully evaluated and adapted to each crop and region. Nowadays, the clients demand agility and accurate information about their crops, whilst the insurance sector needs to respond within the necessary speed to their demands and to an eventual claim”</p>	<p>“From reinsurer view, follow up and support client’s process for an operation improvement”</p>	<p>“Information about disrupting technologies around the world, using particularly in the crop insurance”</p>	 <p>“Front-end agile tools and trained people will always make the difference. Which includes the education of the clients to accept new technologies to assess any claims and let clear the outcome to their insurance policy”</p>
Oceania	<p>“Ability to verify crop yields for post harvest crop policies. This may include remote sensing data or harvester yield monitors”</p>	<p>“Cost effective and long life sensors. Data is not to be able to be doctored by farmers or other input agents”</p>		<p>“Insurers need to commit to minimum standards in respect of loss adjustment and solely engage with sector professionals. They also need to be prepared to pay for excellence”</p>

Europe		“Big data, remote sensing, drones, blockchain technology”	“Spatial information about the fields and insured crops (in some countries available) are needed for loss assessments. Information about the soils would be useful to improve index products. Also historical yield data for the verification of index models are important”	
	“Portfolio management. Automation tools and applications”	“Need more data from machinery units, somehow easier assessment of stocks and crops under roof. Easier view about the quality of the farm buildings”	“Remote sensing and improved modelling of crop development based on available data”	
	“Information about hails and other natural events is not collected centrally by any authorities. Thus we don't have clear picture of highly exposed zones and get bad portfolio concentration due to anti selection”		“The main challenges are the availability and quality, the integration (interfaces) and the interpretation of data”	“Dissemination of the satellite data set and information on yielding from individual farms (individual registers, sensors, etc.)”
	“Better granular, geo-referenced and calibrated (e.g. combine) data, AI and ML, all information available in one platform”	“GIS systems processing data on concluded insurance contracts”	“Farm data transparency and availability. Instruments that enable easy access to raw farm data, weather data, loss history, etc. (structured/semi-structured)”	
	“Third party independent yield verification data. Adjusted historical yield data sets”	“It is all about data and the handling of large amount of data. The more granular and the more frequent data you have the better. Best would be if farmers would share their individual data from precision farming equipment”		“Mobile applications supporting damage estimation”
	“Systems supporting electronic communication with customers/victims”	“Drones, satellite remote sensing, weather data obtained automatically”	“Prognostic models describing the phenomena included in the scope of insurance protection”	“Aggregation and visualization systems (digital maps) agrometeorological data (including remote sensing), soil data, yield monitoring, etc.”
	Africa		“Crop estimates and loss assessments to be done through latest technology like AI/MATLAB and also drones etc.”	“More research on the effect of hail damage on crops”
				