

# The ABC of Crop Insurance as a Risk Management Tool

A MANUAL FOR TRAINERS



## Acknowledgements

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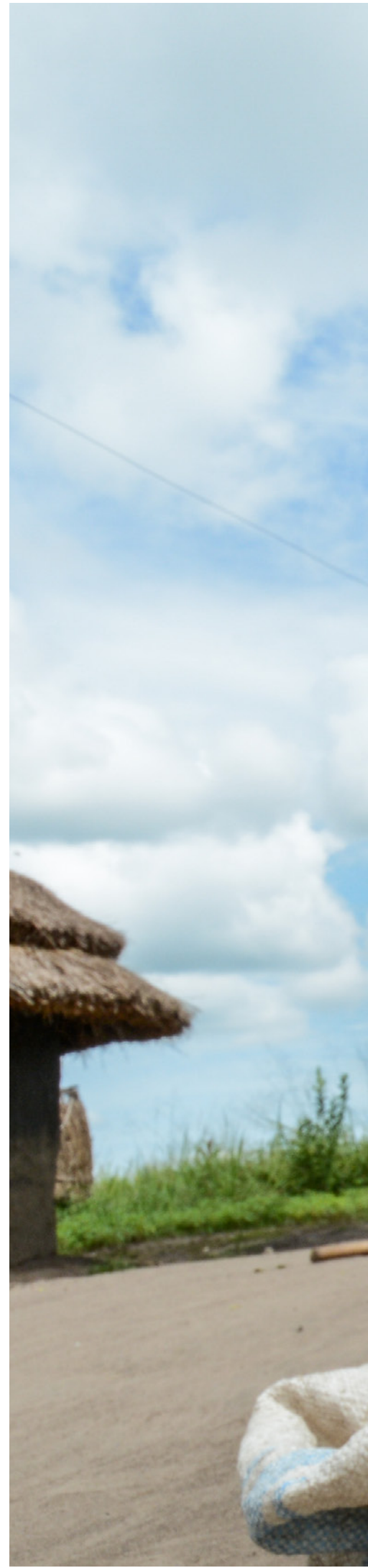
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# Introduction

Though crop insurance bears the promise of cushioning farmers from climate risks and other risks, adoption of insurance products by farmers is low. Among the many reasons for the low uptake is lack of a good understanding of the role of crop insurance as a risk management tool. This manual addresses this problem at a technical level with a focus on agricultural risk, agricultural risk management, and the concepts associated with crop insurance.

## Purpose of the manual

The main purpose of this manual is to demystify concepts on crop insurance and elaborating its role as a risk management strategy at a technical level. The manual incorporates new concepts and innovations not in existing manuals.

## Who will use the manual

The manual is to be used by trainers of trainers of crop insurance, extensionists working on crop insurance, champion farmers, and anyone working on agricultural risk and agricultural risk management.

## How to use the manual

The content in this manual is sufficient for training purposes. However, for a deeper understanding of the role of crop insurance in agricultural risk management, the reader should consult other resources. The manual provides some of those resources. For a better understanding of what farmers need to know about crop insurance and how such information should be delivered to the farmers, the reader should also review the farmers' manual on crop insurance.

## Expectation from the training

At the end of the manual the reader will:

- ✓ Understand agricultural risks and agricultural risk management better.
- ✓ Understand the fundamental concepts of crop insurance and how the insurance works.
- ✓ Know the role of crop insurance as a risk management tool.
- ✓ Know what farmers need to know about crop insurance.
- ✓ Be able to explain crop insurance to farmers in a manner the farmers can understand and facilitate informed decision making.

## About the manual

The manual contains 4 main interlinked modules:

- 1 Risk in agriculture
  - 2 Agricultural risk management
  - 3 Crop insurance and its role in management of agricultural risks
  - 4 Farm decisions
- Most frequently asked questions by farmers about crop insurance

## What is new

- The manual contains many illustrations on the concepts to enhance clarity.
- The content in the manual was obtained from several sources including online resources and interactions with various actors. Therefore, it incorporates new innovations in crop insurance.
- An associated farmers' manual to demystify the concept further and inform trainers on what farmers want to/should know, and how best the information should be delivered.

## MODULE 1

# Agricultural risks

Agriculture is always said to be risky. This is because there are many unforeseen events, which negatively affect production, harvesting, post-harvesting, and marketing activities and outcomes. These are called **agricultural risks**. The risks are also sometimes referred to as perils.

Agricultural risks can be classified into many categories based on:

- 1 The **stage** (level) of the agricultural value chain that the risks affect.
- 2 **Sources** of the risks
- 3 **Scale** (geographical region affected by the risk) and frequency (how many times the risk occurs) of the risks

It is important to note that these classifications overlap.

### IMPORTANT TERMS

**Agricultural value chain:** The actors and activities involved in producing an agricultural commodity from the farm to the consumer. For example, the maize value chain will consist of input suppliers (fertilizer, seeds etc.), you the farmer, brokers and traders, and consumers.

**Hazard:** A factor that may cause loss. For example, climate hazards include heavy rain, strong winds, wildfires, and drought.

## 1 Risks based on the stage/level of the agricultural value chain

**Production risks:** These risks affect all activities and outcomes relating to production. The risks include all the factors that affect the quality and performance of inputs (for example germination of seeds), and the quality and quantity of yields (outputs).

**Market risks:** These risks are associated with marketing activities and outcomes. Examples of market risks include fluctuations in input and output prices.

**Financial risks:** These risks affect how farm activities are financed. Examples of financial risks include an increase in interest rates, or income shocks that reduce available capital for agricultural investments.

**Personal risks:** These are risks that affect an individual, and ultimately affect agricultural activities and outcomes. For example, sicknesses reduce labor hours devoted to farming activities.

**Institutional risks:** These risks can also be political risks. They affect the agricultural environment through policies and laws, for example export bans, and taxes.

**Technological risks:** These risks entail uncertainties around technologies. For instance, the current debate on genetically modified seeds is a technological risk (also an institutional risk). Also, when technologies become obsolete when farmers have already incurred costs on these technologies is an example of a technological risk.

## 2 Risks based on the sources

The main source of agricultural risks is the **climate**. The elements of the climate associated with risk are usually called hazards. The main climatic hazards include drought, floods, unpredictable rainfall, frost, hailstorms, and strong winds.

Some sources of risk are **biological**. Examples of biological risk sources are pests and diseases.

Other sources of risk overlap with the stage/level classification, which we have discussed above. For example, technology, markets, and institutions are sources of **agricultural risks**.

## 3 Risks based on scale and frequency of occurrence

Agricultural risks occur either at the farm level, or at a regional level. Risks that are unique to individual farms are called **idiosyncratic risks**. For example, if a farmer gets low yields, and the low yields are because of the farmer failing to take care of her crop, then the low yield is an example of an idiosyncratic risk.

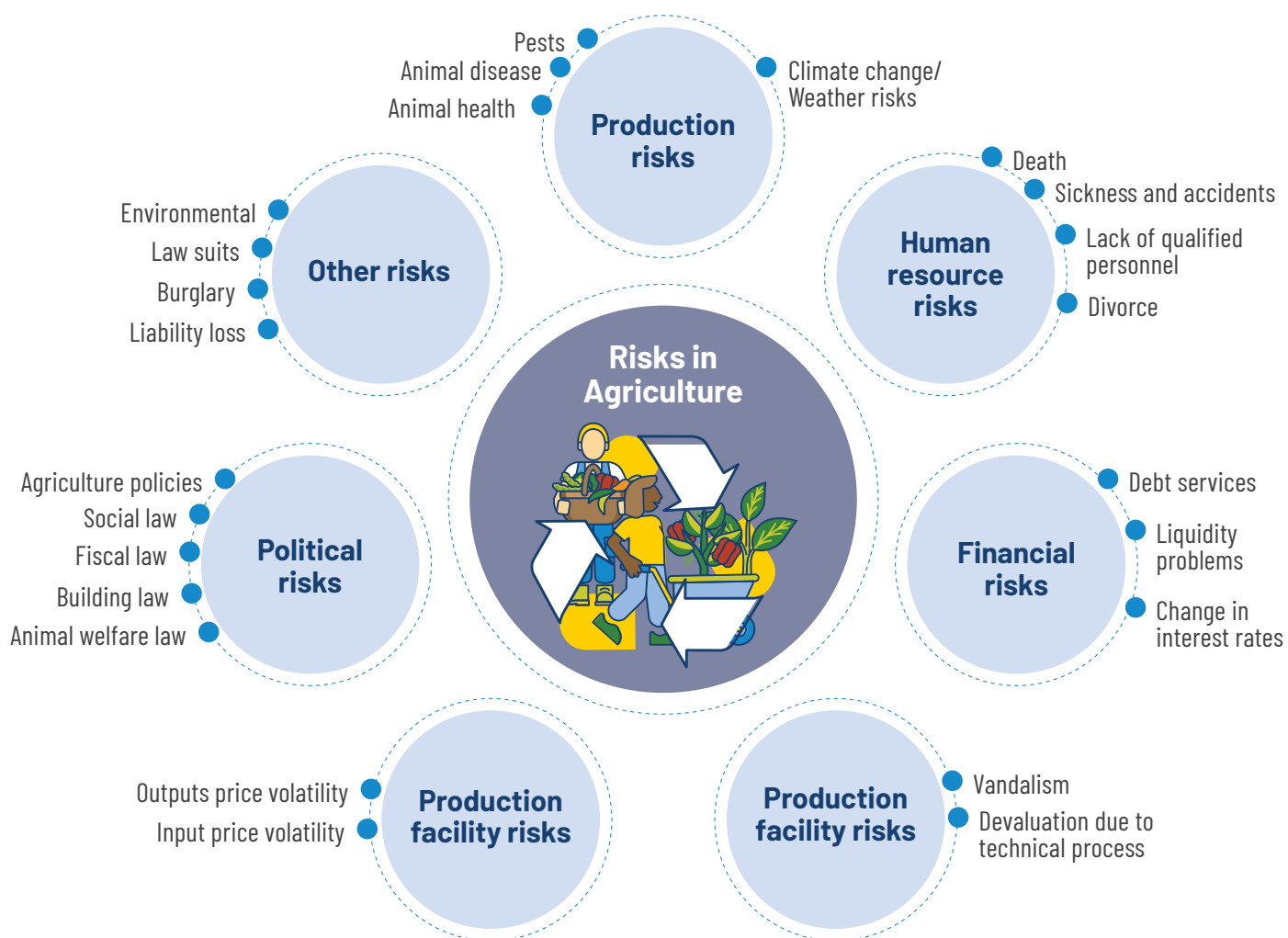
Risks that affect a large geographical region are called **systemic risks**. For example, the recent drought that Kenya experienced is an example of a systemic risk.

Lastly, some risks occur frequently with a certain pattern but have small impacts. These risks are called **systematic risks**. The distinction between systemic and systematic risks is not clear since some systematic risks can occur in a certain pattern. For example, it is almost certain that heavy rainfall/floods are always anticipated after a long dry season.

Some other risks occur less often but cause great loss. These risks are called **catastrophic risks**. Extreme drought is an example of catastrophic risk. Some other countries suffer earthquakes, or tsunamis that cause great damage. These two events are also catastrophic risks.

Table 1: Types and levels of agricultural risks (Source: OECD 2009, adapted from Harwood et al. 1999 and Holzmann and Jorgensen, 2001)

	Micro (Idiosyncratic) Individuals/Households	Meso (Covariant) Groups/Communities	Macro (Systemic) Regions/Nations
<b>Market prices</b>		<ul style="list-style-type: none"> <li>Changes in price of land</li> <li>New requirements from food industry</li> </ul>	<ul style="list-style-type: none"> <li>Changes in input/output prices due to shocks</li> <li>Trade policy</li> <li>New markets</li> <li>Endogenous variability</li> <li>Exchange rates, etc.</li> </ul>
<b>Production</b>	<ul style="list-style-type: none"> <li>Non-contagious diseases</li> <li>Personal hazards (illness, death), etc.</li> </ul>	<ul style="list-style-type: none"> <li>Rainfall</li> <li>Landslides</li> <li>Pollution</li> </ul>	<ul style="list-style-type: none"> <li>Floods</li> <li>Droughts</li> <li>Hail</li> <li>Frost</li> <li>Pests/Contagious diseases</li> <li>Technology</li> <li>Food shortages</li> </ul>
<b>Financial</b>	<ul style="list-style-type: none"> <li>Changes in income from other sources (non-farm)</li> </ul>	<ul style="list-style-type: none"> <li>Informal credit and insurance systems</li> </ul>	<ul style="list-style-type: none"> <li>Changes in interest rates</li> <li>Changes in value of financial assets</li> <li>Changes in access to credit</li> </ul>
<b>Institutional/ Legal</b>	<ul style="list-style-type: none"> <li>Liability risk</li> </ul>	<ul style="list-style-type: none"> <li>Changes in local policy or regulations</li> </ul>	<ul style="list-style-type: none"> <li>Changes in regional or national policy and regulations</li> <li>Environmental law</li> <li>Agricultural payments</li> </ul>



Source: Based on Nather and Theuvsen 2012; Lehrner 2002

Figure 1: A summary of agricultural risks

## Why is it important to understand agricultural risk?

Effective risk management depends on the strategies farmers use to manage various risks. Some strategies are effective for some risks and not for others. The choice of strategies depends on other things but importantly the risk perceptions of the farmer and the available strategies.

### IMPORTANT NOTE

Though risks are usually measurable and quantifiable, different risks may mean different things to different people. The meanings that different people make from different risks are called **risk perceptions**. Because of this aspect of risk, agricultural risk can be either:

- 1. Subjective**, meaning that different people interpret the same risk in different ways.
- 2. Objective**, meaning that the risk is measurable and quantifiable. In other words, interpretation is the same across individuals and contexts.

Agricultural risks are unique because they are highly interlinked in the sense that some of them have common sources, and common consequences. In addition, a risk at one point of the value chain affects subsequent stages of the chain.



## MODULE 2

# Agricultural risk management

We have seen that unanticipated events negatively affect farming activities and outputs. We called these events risks. Even though the events are unexpected, a farmer can take some precautions, for example adopt new technologies to either reduce or eliminate the effects of a risk or the probability of the risk happening. The effort farmers put to prevent, cope, and mitigate risks is called **risk management**.

**Risk management strategies** are the tools or instruments farmers use to manage risk. Risk management strategies can be used for:

- **Prevention:** These strategies reduce the probability of the risk happening
- **Coping:** These strategies relieve the impact of the adverse event
- **Mitigation:** These strategies reduce the impact of the risk

There is an array of risk management strategies available to farmers. Risk management strategies are either on-farm strategies or market-based strategies.

**On-farm strategies** are those usually employed on the farms by the farmers. They include production technologies such as use of early maturing varieties, drought tolerant varieties, crop rotations, and crop diversification just to mention a few.

On-farm risk management strategies can be done by individuals, or by groups of farmers, or even cooperatives. Some farmers form groups to help each other access agricultural inputs, and credit. Such arrangements where farmers manage some risks through some form of organization is sometimes referred to as “informal” risk management.

**Market-based risk management strategies** are those that involve a third party and are usually driven by the market forces of supply and demand. There are structured guidelines on how farmers interact with the third party, usually a provider of a service that enables risk management. This is why these strategies are also sometimes called “formal” risk management strategies. An example of a market-based risk management strategy is insurance, contracts, and credit. We discuss this more in the module on crop insurance (module 3).

## How do the various strategies work?



Some of the risk management strategies entail passing the risk to another party. This is called **transferring risk**. An example of risk management through transferring risk is the use of crop insurance. The farmers transfer risk to the insurer. We will discuss this in more detail in the insurance module.



Sometimes farmers may form a group, or cooperative to pool resources to buy inputs at a cheaper price, or aggregate produce to sell at a higher price. This is called **risk pooling**.



Sometimes a farmer may grow different crops or engage in different agricultural enterprises. This is called **diversification**.

### IMPORTANT TERMS

**Data:** These are facts and statistics collected to be analyzed to provide certain insights about something.

**Satellites:** An artificial body placed in space for communication or to collect information

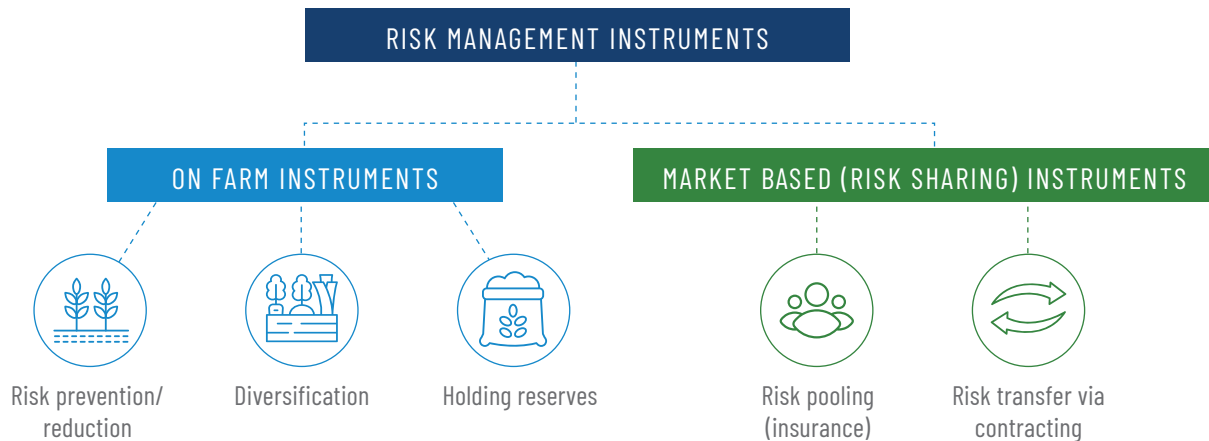


Figure 2: Risk management strategies in summary

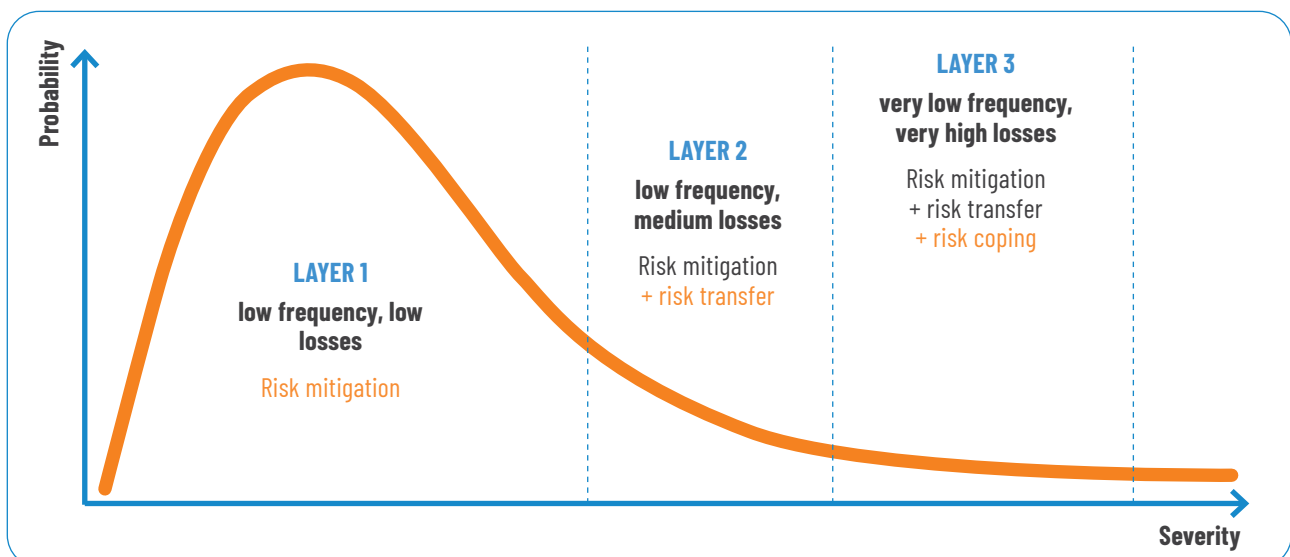
## Choosing the appropriate risk management strategy

Now that we have understood what risk is and the risk management strategies available to the farmer, it is important to note that there is no one fit for all risk management strategy. As we already saw, some risk management strategies work for some risks but not for others.

Below is a summary of risk characteristics that should inform a farmer on whether the chosen risk management strategy is appropriate:

- a. Severity of the risk (how bad is the risk)
- b. Frequency of the risk (how soon/often does the risk happen)
- c. The sources of the risk (what causes the risk)
- d. The consequences of the risk (what are the implications of the risk on activities and outcomes).
- e. Whether the risk is measurable and quantifiable (can we have an objective measure of the risk?)
- f. The level of the risk (individual level, community or group level, macro-level)
- g. Is the risk controllable either at farm level or regional level?
- h. When the risk occurs (this is the timing of the risk; is it at harvest, before harvest, or before planting)
- i. Is the risk correlated with other risks? In other words, does the risk originate from the source as other risks, or does the risk have the same consequences as the other risks.

One useful approach usually used to match a risk to the best risk management strategy is **risk layering**. Risk layering means segmenting risks into different layers based on the risk characteristics. Figure 3 illustrates this concept. The layering facilitates the decision of which risk management strategy to use for which risk.



## Why is it important to understand agricultural risk management?

Farmers depend on agriculture for income and food. They put in resources including land, money, and time meaning that a lot is at stake. Therefore, understanding how to prevent loss, and how to address any barrier to realizing sustainable income and food supply is paramount.

When farmers effectively manage the risks they face, they reduce their exposure to the risks and associated shocks, meaning that they can adopt productive

technologies, and modern methods of production, which ultimately increase yield and returns from agriculture.

Reduced exposure to risk also makes the farmer eligible for some agricultural services. A low exposure to risk also may mean that the services will be provided to the farmer at a lower cost. We will talk more about some of the services in the next module.

## Emerging innovations for agricultural risk management

The task of identifying risks, and the combination of strategies to be used to manage the risks is not a trivial one. A farmer needs to know most of the risk characteristics discussed above. The biggest challenge is that farmers do not have enough information to help them make better risk management decisions.

Information and Communication Technologies (ICTs) come in to solve some of the challenges. We will discuss a few applications of ICTs in agricultural risk management. Readers interested to know more about digital technologies for agriculture can consult the "Digital Agriculture Profile for Kenya".

ICTs are useful in risk management in the following ways:

- **Anticipation of risk:** Technology can be used to predict the likelihood of a risky event. For example, analysis of historic climate data can be used to predict the probabilities of climatic events in the future as well as provide patterns of such events. In the past, weather and climate data was collected from weather stations by "weathermen". Currently, huge amounts of data are collected by satellites.
- **Agri-advisories** help farmers to anticipate risk, and to know the risk management strategy likely to be most effective for the anticipated risk.

- **Risk identification and decision making:** Technology can help farmers identify risks. For example, through sensors, farmers can differentiate symptoms from climate impacts, and mineral deficiencies, which will guide them on the management strategy to use.
- **Market linkages:** Mobile platforms (technologies) link farmers to credible suppliers of inputs as well as potential buyers for their outputs. Such linkages reduce market risks (input and output prices).
- **Access to information:** Mobile technologies make it easier for farmers to access information about new technologies, expert advice, and agri-advisories.
- **Quality assurance:** Sometimes it is important to know the origin of an input (traceability) for quality assurance. Modern technologies such as blockchain enable traceability.
- **Precision agriculture:** Involves the use of technology to gather and process information from several sources to facilitate farm decisions on for instance the amount of fertilizer and pesticides to apply. The main goal is to increase yields through the optimal use of inputs. Approaches such as precision agriculture help farmers avoid some production and technological risks.



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## MODULE 3

# Crop insurance

### RECAP OF CONCEPTS

Before we learn about crop insurance, let us revisit some of the concepts we have learnt in the first 2 modules that will help us have a better understanding of crop insurance.

- **Risks** are unforeseen events that negatively affect agricultural activities and outcomes.
- The instruments/tools that farmers use to prevent, cope, or mitigate risk are called **risk management strategies**.
- Strategies can be **on-farm** or **market-based**. The market-based strategies are also called formal risk management strategies.

Sometimes, farmers may also manage some risks in groups or cooperatives. This arrangement is called informal risk management.

- There is no one-fit-all risk management strategy. Therefore, **farmers need to combine several risk management strategies**. This means that some risks need both informal and formal strategies.

With the above in mind, we now turn to crop insurance.

### What is crop insurance?

Crop insurance is a market-based risk management strategy through which farmers transfer risk to another party, usually an insurance company.

Remember that there is another form of insurance that is not market-based. We called this insurance “informal” insurance (risk management). Usually, farmers organize themselves into groups that help them to buy inputs at a lower price, or sell outputs at higher prices, or provide for group members who experience some form of financial, or consumption shock.

The focus of this manual is the market-based crop insurance.

As we have already seen, crop insurance cannot be used to manage all agricultural risks on the farm. Risks that can be managed through crop insurance are called **insurable risks**. Insurable risks have the following characteristics:

- 1 The risks are measurable and can be quantified to enable loss estimation.
- 2 The risks are not correlated with other risks.
- 3 The risks are beyond the control of the farmer. In other words, they are not caused by intentional human actions. Intentional human actions may include government regulations, or farmers failing to take care of their crops.
- 4 The risks have some known frequency with which they occur. This characteristic enables measurement and quantification.
- 5 The risks have adverse effects on the farmer, but the consequences are not catastrophic. However, recent innovations enable covering catastrophic risks.

## How crop insurance works in simple terms

A farmer identifies an insurable risk relating to either farm activities, equipment, or outcomes. The farmer then identifies a credible insurance company that can cover that risk. The farmer then agrees with the insurance company that she will pay some price upfront in anticipation of the risk based on the value of her insurable interest. If the farmer suffers a loss from the insured risk, and is verifiable that she suffered the loss, then the farmer applies for compensation. The insurance company then compensates the farmer based on the agreement they had.

However, it is not this simple. Let us now break down some things to help you understand better. We start with the key concepts based on the simple explanation given above.

- **Claim:** Application for compensation by the farmer after suffering a loss
- **Insurer:** This is the insurance company providing the insurance.
- **Insured:** This is the farmer in our case, or in other words the person who “bought” the insurance.
- **Premium:** This is the money the farmer pays the insurer in return for the insurance “to be” offered.
- **Policy:** This is the agreement or contract between the farmer (insured) and the insurance company (the insurer). Therefore, the insured is the policy holder.
- **Peril (risk):** This is the risk covered. Remember that the risks that insurance can cover have some characteristics that make the risk insurable.
- **Sum-insured:** This is the value of the item or property insured.
- **Insurable interest:** This is what the farmer wants to insure. For example, the farmer can insure yield, output prices (or revenue in some cases), farm equipment such as tractors, or inputs such as seeds and fertilizer.
- **Pay-out:** This is the money that the farmer receives after putting in a claim as compensation.

### ACTIVITY

Now let us see if we got everything correct by making the simple description on how insurance works a bit more technical, by filling in the right technical term.

A farmer identifies an \_\_\_\_\_. The farmer then identifies a credible \_\_\_\_\_ that can cover the \_\_\_\_\_. The farmer then agrees with the \_\_\_\_\_ that she will pay a \_\_\_\_\_ upfront in anticipation of the \_\_\_\_\_ based on her \_\_\_\_\_. If the farmer suffers a loss from the insured risk and is verifiable that she suffered the loss, then the farmer puts in a \_\_\_\_\_. The insurer then gives the farmer a \_\_\_\_\_.

*Correct answers (in order of questions asked): insurable interest, insurer, risk, insurer, premium, risk, sum-insured, claim, payout*

## Types of crop insurance

Crop insurance can be grouped into two main categories namely:

**Indemnity based products:** The insurer verifies losses at farm level and pay-outs are made based on these individual farm level losses. Indemnity based insurance can be:

- a. Named peril products: These products cover a specific risk (one risk).
- b. Multiple peril products: These products cover more

than one peril such as diseases, hail, frost, drought and many more (covers many risks).

**Index-based insurance:** Instead of verifying actual losses on individual farms, index-based insurances use an agreed upon objective, verifiable measure that is strongly correlated with the insured interest. This means that the insurer doesn't have to verify losses on individual farms. There are several indices used for crop insurance. We will discuss the various indices in the following sections.

## Why both indemnity based and index-based insurance?

Indemnity based are the traditional products. However, these products face serious challenges namely:

- High administrative costs because losses are verified at farm level.
- These products are prone to information asymmetries in the sense that farmers may intentionally fail to take care of their crops and in the end claim for the losses they suffer. This becomes a problem especially because small-scale farmers never keep records to help in knowing production trends.

Index-based products were developed to address the challenges of indemnity-based insurance products. However, the index-based products brought in some other challenges. The main challenge is when the index used does not correlate with the insured losses.

Before we discuss the challenges associated with index-based insurance, especially basis risk, let us now see a simple description of how index-based insurance works.

## A simple description of how index-based insurance works

For a farmer to receive a payout once she has put in a claim, the insurer needs to verify the losses. For indemnity-based insurance products, the insurer goes to the individual farms to verify the loss. Once the loss is verified, the farmer then receives a payout for the losses as agreed in the insurance policy.

For index-based insurance products, the insurer does not verify the losses on individual farms. Instead, the farmer gets a payout only if the objective agreed upon measure that highly correlates with the insured interest shows that there was a loss. This approach has the advantage of being objective in that it cannot be manipulated by the insurer or the insured. However, the biggest problem of index-based insurance is when farmers suffer a loss but the index does not show that there was a loss.

Let us now graduate the simple description into a technical one. We start with the key concepts.

- **An index:** Is a combination of various data used to measure something. We will discuss the indices in detail in a moment.
- **Basis risk:** The mismatch between losses on the farm and the index. This means that the farmer might suffer a loss, but the index fails to register the loss.
- **Indemnity:** The payout the farmer receives once the losses for which she put in a claim have been verified. An indemnified farmer refers to a farmer who has received an indemnity.
- **Trigger:** When the index shows that there was a loss based on a certain pre-determined value.
- **Threshold:** The agreed upon value below which the index registers a loss.

### ACTIVITY

Now let us see if we got everything correct by making the simple description on how insurance works a bit more technical, by filling in the right technical term.

For a farmer to receive a payout once she has put in a claim, the insurer needs to verify the losses.

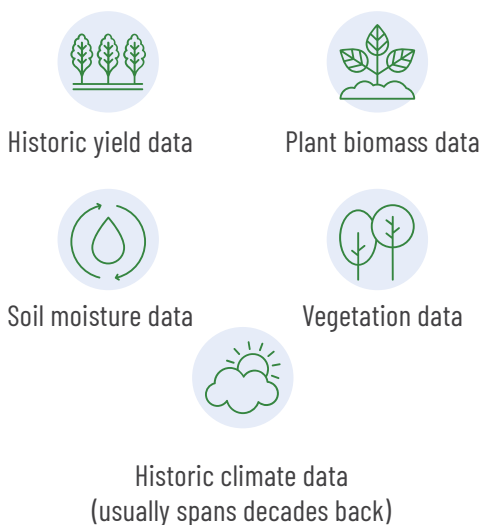
- For \_\_\_\_\_ insurance products, the insurer goes to the individual farms to verify the loss. Once the loss is verified, the farmer is then \_\_\_\_\_ as agreed in the insurance policy.
- For \_\_\_\_\_ insurance products, the insurer does not verify the losses on individual farms. Instead, the farmer gets a payout only if the \_\_\_\_\_ . This approach has the advantage of being objective in that it cannot be manipulated by the insurer or the insured. However, the biggest problem of index-based insurance is \_\_\_\_\_.

## Understanding basis risk

Though we have said that index-based products came into being to address the challenges with indemnity-based products, we have seen that the biggest challenge with index-based insurance products is **basis risk**.

The level of basis risk depends on the index. Recent innovations combine several indices to increase precision and the reliability of the index.

Remember that an index is data reduced/processed to represent some phenomena. The indices are usually named based on the data that was used to construct the index. Some of the data used to make crop insurance indices include:



### So, what are the indices?

As you might have guessed, the indices are:

**Area yield index:** This index is constructed from historic yield data of a given region. The farmer usually gets indemnified if the yield is below the agreed upon level in the region regardless of the yield on individual farms.

**Weather-based index:** This index is constructed from historic climate data such as precipitation. If the rainfall in a region (usually called a unit area of insurance) is below a pre-specified amount in a certain period, then the index triggers.

**Soil moisture index:** This is a form of weather-based index that is derived from soil moisture. The soil moisture index is considered more reliable than other weather-based indices.

**Normalized difference vegetation index (NDVI):** This index is constructed from satellite

images of the quality of vegetation collected over a long period of time. This index is usually used for livestock insurance.

**Picture-based index:** As the name suggests, this index is constructed from pictures of the crop at various stages of growth. The pictures are then processed to verify losses. This index is usually used together with other indices to reduce basis risk. It is important in loss verification.

### Forms of basis risk

We have seen that basis risk occurs when there is a mismatch between the index and the actual yield on the farm. Basis risk can take the following forms:

- **Design basis risk:** Occurs when the product doesn't adequately correlate with yield. Therefore, it fails to trigger when farmers experience losses on the farm.
- **Spatial basis risk:** Occurs when the index does not capture the variability across geographies. For example, weather data might show that there was adequate rain in the whole of Imenti Central, while only a few areas of the sub-county received rainfall.
- **Temporal basis risk:** Occurs when the index does not capture the growth stages of the crop. Crops have different water and nutrient requirements through their growth.

### Strategies used to overcome the various forms of basis risk

- 1 **The use of high-resolution data** in designing insurance products. Remember about the digital innovations we spoke about in the risk management section? Advancements in remote sensing technologies (such as satellites and sensors) facilitate observing farms in greater detail. Satellites can see what is happening on the ground!
- 2 **Combination of datasets**, as we mentioned earlier. Some insurance products combine several indices. For example, combining a soil moisture index (weather index), with a picture-based index.
- 3 **Considering risks across the growth stages of a crop** to overcome temporal basis risk. For example, insurance products for maize provide a germination stage cover, vegetative stage cover, flowering stage cover, and pre-harvest stage cover.

## Bundling crop insurance

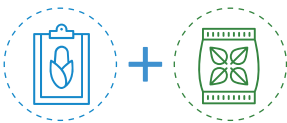
Though we have seen that basis risk is a big challenge for index-based insurance, it is not the only problem. We have also seen that crop insurance cannot address all agricultural risks. Sometimes, the insurance may not address the main risk of the farmer. Therefore, the insurance may not be relevant to the farm.

A strategy used to address this issue is providing insurance alongside something else that addresses a challenge along the agricultural value chain. This strategy is called **bundling**. In other words, bundling enables a farmer to choose what is at least useful to her, and that she can access multiple commodities or services simultaneously. It also means that different stakeholders in agriculture work together!

### Examples of bundles:



Crop insurance      Cash loan



Crop insurance      Fertilizer



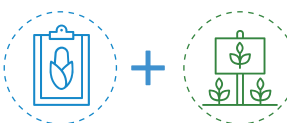
Crop insurance      Improved seeds



Crop insurance      Improved seeds      Fertilizer



Crop insurance      Agri-advisories



Crop insurance      Contract farming

- With buyers
- With agricultural service providers such as extension



### THE BIG QUESTION

#### How are prices for insurance determined? Can the price for crop insurance be lower?

Unlike other commodities and services, the premium one pays for crop insurance is not standard. Several factors determine the price. We now look at those factors.

- 1 The type of crop grown: Different crops have different risk exposures to risk.
- 2 Variety of the crop grown: Improved varieties are well adapted to some of the climate risks.
- 3 Location of the farmer: Used to ascertain the risk exposure of the farmer.
- 4 Planting dates: The dates determine water availability in the soil for the crop.
- 5 The level of coverage (sum insured). The higher the sum insured, the higher the premium.
- 6 The number of perils covered: A multiple peril cover will be more expensive than a single peril cover for example.
- 7 Risk profile of the farmer: Some of the factors mentioned above contribute to the risk exposure of the farmer. The following factors make a farmer to have a low risk profile:
  - Adoption of improved varieties
  - Use of on-farm risk management strategies such as irrigation
  - Timely planting

Premiums are usually calculated as a percentage of the sum insured based on the above factors. Farmers in high risk will pay higher premiums compared to those in low-risk areas.

Farmers with a low profile will pay a lower premium for the same product compared to those with a high-risk profile. **Therefore, insurance (we saw that insurance is a market-based strategy) should complement on-farm risk management strategies, as well as informal risk management strategies.**

Important to note is that insurance may not always cover 100% of risks. The farmer bears some of the risk. In other words, insurance might cover 70%, 80% or 90% of the losses.

Lastly, an important factor that influences the premium paid is the cost the insurer incurs in gathering information during contract initialization as well as loss verification. Modern innovations through the digital solutions we spoke about in the risk management sections have been used to address this problem.



## Innovations around premiums and premium payment

One digital solution anticipated to reduce premiums through reduced transaction costs is blockchain. Blockchain is a “chain” of linked records that are securely shared among many users. Through a blockchain platform, the various data used in the development of the insurance product are linked to enable:

- Quick contracting process (smart contract), which reduces transaction costs.

- Automation of claim payment. This enhances transparency in the claims processing. This also makes the process more objective with little interference by either the insurer or the insured.

Below we provide an example of how blockchain is used in agricultural insurance. Some of the organizations providing services on the use of blockchain technology include [Sprout Insure](#).

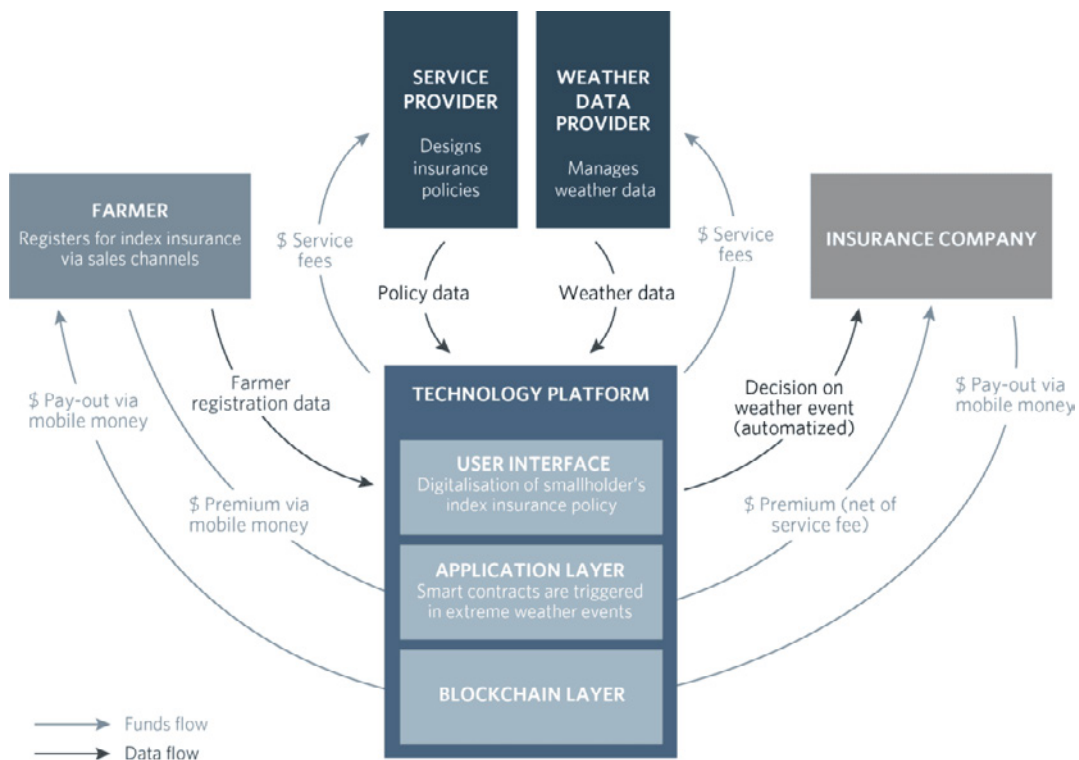


Figure 4: Blockchain crop insurance (Source: The Lab – Driving Sustainable Investment)

## How do farmers pay premiums?

Farmers can pay premiums through many methods. The methods vary across insurers as well as insurance products:

- Farmers can pay premiums using the mobile money platform (Mpesa). Some insurance companies provide scratch cards to the farmers. The farmers then subscribe to the insurance cover through the code on the card and pay a premium through Mpesa.
- Farmers can also pay cash at designated insurance outlets.

### Premium payment arrangements

Premium payment arrangements also vary with the insurer and the insurance product as we summarize below:

- 1 The most common arrangement is where farmers pay for insurance at market prices **at the start of the season**. The main challenge with this arrangement is that some farmers may be limited financially.
- 2 Sometimes farmers pay **in instalments**, a certain fraction at agreed upon times.
- 3 Sometimes, farmers pay **after harvest**. Usually, the premium is deducted from revenues from produce.

## How to access crop insurance

Crop insurance can be accessed through:



Insurance companies' outlets at county level



Insurance brokers



Champion farmers/  
village champions



Agrovets



Insurance agents

## Clearing misconceptions about crop insurance from what we have learnt

MYTH	TRUTH
Once a farmer has bought crop insurance, there is no need to take care of her crop	Farmers should adopt good agricultural practices. Crop insurance adds an extra layer of protection for farm investments. Good agricultural practices and crop insurance are complements.
Farmers always get a payout once they have taken an insurance	Farmers do not always receive payouts. Whether a farmer receives a payout depends on whether losses occurred. The losses must be verified.
Someone always assesses losses at the farm level once a claim has been raised	No! It all depends on the type of insurance product. For multiple peril products (indemnity based), a few farms are sampled. Farmers are then compensated based on the yield from the sampled farms. For index-based products, the index triggers once a certain condition is achieved. Nobody goes to the farm to verify losses. Data used to make the indices are collected by satellites.
All insurance providers are scams!	No! There are credible insurance providers. Modern innovations reduce the chances of insurers behaving strategically. For example, the triggers are not controlled by the insurer. The payouts are not also controlled by the insurer.
All insurance products are the same. Therefore farmers do not have to worry about the perils covered by an insurance product	No! There are several insurance products in the market. Different products cover different perils. In addition, different products work differently. Therefore, farmers should assess an insurance product carefully before purchasing it.
Crop insurance is for the rich farmers	No! Crop insurance is for all. Remember that crop insurance provides protection against risks. Good management of agricultural risks means high yields, and high revenues. Farmers pay premiums according to the size of land they have planted, and their sum insured.
Nobody understands how premiums are calculated	No! The amount of money a farmer pays for an insurance product is objectively determined. Factors that influence the amount of premium paid by the farmer include: <ol style="list-style-type: none"> <li>1. Farm size.</li> <li>2. Risk exposure of the farmer (location of the farm).</li> <li>3. Type of crop.</li> <li>4. Variety of the crop.</li> <li>5. Sum insured.</li> <li>6. Risk profile of the farmer</li> </ol>
All insurance products cover the farmer from all perils	No! Insurance only covers the perils as agreed in the insurance policy. If the policy covers excess rainfall, a farmer will receive a payout from losses from excessive rainfall only. Different products cover different perils. The more the perils, the higher the premium.
Crop insurance suffers from the same old problem	No! There are several innovations addressing the various challenges of crop insurance. For example, innovations in product design aim to reduce basis risk, reduce transaction costs when purchasing insurance as well as putting in claims, and automation of payouts.



# Extra resources

## Example of an insurance policy (soil moisture product by ACRE Africa)

Soil moisture index is developed from high resolution soil moisture data derived from satellites, with a 100mx100m resolution available since 2002. The index is based on agronomic models for various crops in different agro-ecological zones. The payouts are triggered through a transparent process.

<b>Crop(s) to be insured</b>	Maize
<b>Locations of farms (per crop)</b>	Meru
<b>Mode of monitoring</b>	Satellite Soil Moisture Data (Vender sat)
<b>Sum Insured</b>	Subject to farmer choice
<b>Premium Rate</b>	6.5%
<b>Deductible</b>	15%

### Benefits and service covered by the SMI product

<b>Seasonal Cover (Maximum loss payable)</b>	<b>100%</b>
<b>Germination Phase</b>	25%
<b>Vegetative Cover</b>	25%
<b>Flowering Cover</b>	25%
<b>Pre-harvest/Dry down stage</b>	25%

### Summary of soil moisture index coverage

<b>Crop Phase</b>	<b>Insured Peril</b>
<b>Germination</b>	Germination failure as occasioned by deficit soil moisture at germination stage
<b>Vegetation</b>	Growth failure as occasioned by deficit in soil moisture at vegetative stage
<b>Flowering</b>	Flowering failure as occasioned by deficit in soil moisture at flowering stage
<b>Pre-harvest</b>	Pre-harvest damage as occasioned by excessive soil moisture

## Schedule

Assuming a sum insured of Ksh. 10,000

### Period and Start of Cover

Task/ Provisions	Conditions to be met
Planting window	Planting done
Cover starts	Within 5 days or less when average of <b>0.15 mm</b> of Soil moisture is recorded with at least two days with 0.06 mm or more during the planting window
Soil moisture assessment	If we do not record sufficient soil moisture during this window, soil moisture level in the next available window will be checked. If we record some moisture, which is less than the required soil moisture level during the planting window, the contract will start one day after the last day of the window
Cover run period	135 days

### Germination Drought Cover

Germination Drought Cover (Day 1- Day 21)	Conditions to be met
Maximum loss payable	25% of sum insured
Loss assessment per period (Trigger)	Loss is assessed by looking at average soil moisture available every 10 days. The germination cover is broken down into equal periods, each period containing 12, 10-day blocks  Any 10-day block with a total of w mm or less of average soil moisture is considered dry
Loss compensation (Tick)	For each dry block (10-day period), there is a loss of <b>2.08%</b> of the total sums insured equivalent to <b>Ksh 208.33</b> . The maximum loss of Ksh. 2500 is payable at this phase

### Vegetative Drought Cover

Vegetative Drought Cover (Day 21- Day 60)	Conditions to be met
Maximum loss payable	25% of sum insured
Loss assessment per period (Trigger)	Loss is assessed by looking at average soil moisture available every 10 days. The vegetation cover is broken down into equal periods, each period containing 31, 10-day blocks. Any 10-day block with average of x mm or less of soil moisture level is considered dry.
Loss compensation (Tick)	For each dry block (10-day period), there is a loss of <b>0.8065%</b> of the total sum insured equivalent to Ksh 80.65 The maximum loss of Ksh. 2500 is payable in this phase.

### Flowering Drought Cover

Flowering Drought Cover (Day 55-Day 94)	Conditions to be met
Maximum loss payable	25% of sum insured
Loss assessment per period (Trigger)	Loss is assessed by looking at the average soil moisture available every 10 days. The flowering cover is broken down into equal periods, each period containing 31, 10-day blocks. Any 10-day block with an average of y mm or less of soil moisture is considered dry
Loss compensation (Tick)	For each dry block (14-day period), there is a loss of <b>0.8065%</b> of the total sum insured equivalent to Ksh 80.65. The maximum loss of Ksh. 2500 is payable in this phase

### Pre-harvest Excessive Soil moisture Cover

Pre-harvest Excessive Soil moisture Cover (Day 90 - Day 135)	Conditions to be met
<b>Maximum loss payable</b>	25% of sum insured
<b>Maximum Soil moisture recorded</b>	Loss is assessed by looking at the average soil moisture available every 20 days. The maturity cover is broken down into equal periods, each period containing 13.5, 20-day blocks.  Each 20-day period with more than <b>z mm</b> of Soil moisture is a <b>“wet block”</b> and results in a loss.
<b>Loss compensation for period</b>	For each dry block (20-day period), there is a loss of 1.8519% of the total sum insured equivalent to Ksh. 185.19 The maximum loss of Ksh. 2500 is payable in this phase.

### Total Compensation and Deductible

The total loss is the sum of the 4 covers, with the maximum total allowed being 100% of the sum insured (100% x 10,000KES = 10,000KES). Any amount below 10% of the sum insured (15% x 10,000KES = 1,500 KES) will remain with the insured.

If the total loss is greater than 15% of the sum insured, the loss is paid in full subject to the deductible.

**Any kind of exposure not specified under this policy remains fully excluded.**

**We confirm we have read and understood the above terms and conditions and agree to this index cover:**

Name of Insured: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

YEAR	20	20	20	20	20	LONG-TERM
YIELD						

### Also provide actual planting dates for correct monitoring:

Window	Start Date	End Date	Size of land planted
1	25-Aug-22	7-Sep-22	
2	8-Sep-22	21-Sep-22	
3	22-Sep-22	5-Oct-22	
4	6-Oct-22	19-Oct-22	
5	20-Oct-22	2-Nov-22	

Total Acreage: \_\_\_\_\_

Total Sum Insured: \_\_\_\_\_

Premium Rate: \_\_\_\_\_

Total Premium Payable: \_\_\_\_\_

Insurer: \_\_\_\_\_

KRA PIN: \_\_\_\_\_

## Examples of institutions offering crop/agricultural insurance

(Source: organisations' websites)

INSTITUTION	TYPES OF INSURANCE OFFERED
APA insurance	Multiple peril crop insurance (MPCI), named peril crop insurance, area yield index insurance, weather index insurance, greenhouse insurance, forest insurance.
Equity Bank	Index based weather insurance and multiple peril crop insurance, livestock covers, green house policy and pets policy (for example dogs).
ACRE Africa	<p>Weather index insurance, Hybrid Index and MPCI, and Livestock cover.</p> <p>ACRE Africa uses daily rainfall data monitored by satellites or automated weather stations. The hybrid Index and MPCI covers the germination phase of the crop cycle, excluded in traditional, indemnity based MPCI covers.</p> <p>ACRE Africa offers an indemnity product for dairy cows that insures against death from accidents and selected diseases.</p>
Waumini Insurance Brokers	Crop insurance and Livestock insurance
PULA	<p>Area yield index insurance, Hybrid index insurance (a combination of Weather Index Insurance and Area Yield Index Insurance) and Index- Based Livestock Insurance.</p> <p>Together with these insurance products PULA offers agronomy services based on registration data, local climate and agronomic conditions are provided to farmers as individualized digital extension messages to drive behavior change and maximize yields from input investments.</p> <p>PULA is working with Lemonade Crypto Climate Coalition, a non-profit arm of insurance tech firm Lemonade Foundation, that believes it can leverage blockchain technology to provide insurance against climate disasters for upward of 2 billion subsistence farmers on the planet and avoid making the planet hotter while doing it.</p>
CIC Insurance	<p>Crop insurance and Livestock insurance.</p> <p>The policy covers crops against a combination of perils namely drought, excess rains, flooding, hail damage, frost damage, uncontrollable pests and diseases, fire, and related perils.</p> <p>The livestock policy compensates against death of insured livestock because of various perils namely uncontrollable diseases including epidemics, calving down, accidents, emergency slaughter, fire, and related perils.</p>
Shinim Insurance Agency	<p>Crop insurance, single animal cover, bloodstock/horse insurance and Poultry insurance.</p> <p>The cover offers customizable insurance solutions for crop farming, tailored to each operation for different crops. Covers farm assets and equipment including green houses and irrigation facilities.</p>
Old Mutual /UAP	<p>MPCI, Index based crop insurance, and Livestock insurance.</p> <p>It covers all commercial field crops including wheat, maize, barley, rice, tea crop, coffee, sugar cane, tobacco, all horticultural crops, and floriculture and tree crops. It also covers farm assets and equipment including greenhouses and irrigation facilities. The insured farm will have greater access to agriculture credit since the policy document will be accepted by financing institutions as an alternative form of security.</p>
Geminia Insurance	<p>Crop insurance and Livestock insurance.</p> <p>Covers for all commercial field crops including wheat, maize, barley, rice, tea crop, coffee, sugar cane, tobacco, all horticultural crops, floriculture, and tree crop. Covers crop losses from excessive rainfall and drought. Covers farm assets and equipment including harvested crop, green house, and irrigation facilities.</p> <p>A Livestock mortality cover against losses due to accidental death, diseases of terminal nature, emergency slaughter on advice of a recognized veterinary, and theft. Livestock Covered include dairy cattle, beef cattle, poultry, pigs, sheep, and goats.</p>
Heritage insurance	Index- based crop insurance, livestock insurance and forestry insurance.
Madison General Insurance	<p>Crop insurance, livestock insurance, and agripack. Agripack covers livestock, farm building, plants, goods in transit, and liabilities.</p> <p>Crop insurance covers only certain crops which are wheat, tobacco, soya beans, cotton, and maize.</p>
Jubilee Insurance	Crop insurance and livestock insurance, farm assets and equipment including green houses and irrigation facilities



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