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How to Catch Problems Before They Turn Problematic

By Danielle Fisher, Entomologist, CitChem

Agriculture has existed for the last 10,000 years, and we have been learning how to grow the best crops we can ever since. There are many factors that contribute to a productive crop, meaning there are many things that can go wrong.

Problem 1: Plant Stress

Plants have a natural immune response which helps protect them against attack. Safeguarding that plants are in their best condition assures that a crop is less affected by biotic and abiotic factors. There are many scientific studies that have proved that plants in their optimum health are less likely to undergo biotic attack than those that are stressed in some way.

Factors that cause plant stress include over- and under-watering, nutrient deficiencies, mechanical damage and high pest pressures. A good knowledge of what a plant requires, as well as understanding the factors that influence the performance of plants, will aid you in growing the best possible crops.

Problem 2: Pests

One word: scouting! All crops need consistent scouting to see what insects are in the field as well as numbers. This can be done either by hand; walking around the fields and noting any pests that are seen, or with pheromone traps. From here we look at the economic thresholds, the point at which pest numbers are high enough that control measures need to be taken. Scouting is still important after spraying, to confirm the effectiveness of the control measure taken.

Managing caterpillars in the early stages is key to successful control.

It is vital that scouting is done at least once or twice a week, the more frequent the better. If pests can be caught and controlled in the early stages of infestation, less crop damage will occur. Catching insects such as caterpillars in their early larval instars is crucial to effectively managing them. The larger the caterpillars get, the more difficult it is to kill them. The same concept applies for leaf miners such as Tuta absoluta, which becomes very difficult to control when the pest gets into the later stages of it's life cycle and has burrowed into the fruit and leaves.

Problem 3: Disease

Most diseases can be avoided with a good preventative spray programme. This involves spraying products that protect the plant against pathogen growth and reproduction. Once a pathogen gets onto an economically important part of the plant, such as the fruit, nothing can be done to save it. Curative sprays may help, but the infection of those fruits cannot be reversed.

A typical preventative spray programme involves using at least three different fungicidal groups (with a preventative or protective mode of action) and alternating their application every seven to fourteen days. An example may be:

Week 1: Copper Oxychloride
Week 2: Azoxystrobin
Week 3: Mancozeb
Week 4: Copper Oxychloride
Week 5: Azoxystrobin
Week 6: Mancozeb

And this repeats until the plant no longer needs to be protected. In the rains or under pivots, it is recommended to spray every week as the combination of high humidity and cooler weather is very conducive to pathogen reproduction and spread. If disease occurs then a curative programme will need to be implemented.

Weed free fields result in more uniform growth of crops

Problem 4: Weeds

There is a two-part problem to weeds. The first is that, before the crop is even planted, weeds cause problems due to their affinity to host a large manner of organisms. Secondly, when weeds occur within a growing field, they compete with the main crop for elements such as nutrients and space. Some weeds grow so vigorously that they can choke and shade out the plants and take over.

Land that is overrun with weeds should be cleared at least two to three weeks before planting. One major reason for this, which is especially prevalent in open field horticulture, is that weeds provide food for cutworms. The cutworm is a major pest of most horticultural crops and can result in huge losses before germinated plants can even get to their true leaves. If weeds are cleared a few weeks before planting, the cutworm is starved of it's food source and will move away or die. Weeds are hosts for all manner of other problems; nematodes, pathogens like Phytophthora, pests such as aphids and even viruses.

Problem 5: Nutrient Deficiencies

Nutrient deficiencies will massively inhibit a plant's ability to grow. In the same way that we as humans need food to sustain us, so do plants. Nutrients are the basis of plant life, they provide the building blocks for growth, hormones, chemical signaling and so much more. Soil usually contains a fair amount of nutrients but seldom do they meet the plant's requirements. It is thus important to do regular soil testing to ensure the plant's nutritional demands are being met.

Problem 6: Spray Application

This problem is entirely human related. It is important to apply all products correctly for them work effectively. There are many factors that contribute to ineffective spraying. These include time, rate and method of application as well as selection of adjuvants, effective mixing and calibration of spray equipment. Results will be disappointing if spraying is not done properly.

There are many factors that contribute to a healthy crop. Being on the ground and monitoring certain factors regularly is a fundamental requirement to good agriculture. Identifying problems early on is much easier, and cheaper, than dealing with an epidemic.

We are committed to helping farmers effectively deal with their problems in the field. For more information contact us at horticulture@citchem.co.zw or +263 772 235 554.

Common Chicken Diseases During the Rainy Season

By General Beven Mundida, Livestock Consultant

Poultry diseases during the rainy season can be `impelled by; bacteria introduced to the flock through the dripping water coming from many sources and/or immuno-suppression which is trigged by the weather conditions. Some of these diseases that farmers should take note of include;

1. Fowl cholera

The disease is caused by a bacterium called *Pasteurella multocida* and it affects birds from the age of six weeks and above. It is a challenging disease with symptoms that are hard to notice, only to see dead chickens in the fowl run. In acute outbreaks, the first warning sign is usually sudden death of birds which initially appeared healthy. While in chronic cases, affected birds exhibit difficulties in breathing, diarrhea (wet grey, yellow or green droppings), dropped wings and tail feathers, loss of appetite, ruffled feathers, and the tendency of birds to sit quietly with their heads tucked in with their eyes partly closed. Depending on the localisation of the disease, it may result in; lameness and swelling of the legs or wing joints, twisted neck, swelling around the eyes, and discharge from beak or nostril. Symptoms of the chronic cases may be confused with fowl typhoid. Birds should be vaccinated against fowl cholera and incase of disease incidence they can be treated using sulfa drugs or tetracycline.

2. Infectious Bursal Disease (IBD) - Gumboro

The disease is a virulent which affects chicks and young birds between the age of 3-18 weeks. IBD attacks the bursal of a bird resulting in the suppression or weakening the immune system, subsequently predisposing the birds to secondary infections. Affected chickens may exhibit severe prostration, incoordination, watery diarrhea, soiled vent feathers, vent picking, and inflammation of the cloaca.
IBD is highly contagious with flock morbidity (illness) typically 100%, and a mortality range of 5-10%. Unfortunately, there is no effective treatment for this disease but, it can be prevented by administering IBD vaccine according to vet recommendations before an outbreak occurs. In case of an outbreak, the flock should be depopulated of infected birds and rigorous disinfection of contaminated poultry houses and the whole farm is advisable. Normally, maternal immunity and vaccination reduces susceptibility to this infection during the rainy season.

3. E. coli and Salmonella

These two bacterial diseases affect birds of all ages by distressing the digestive system of infected birds. Disease occurrence is higher in farms or pens with poor sanitation. The degree of stocking density and inadequate ventilation highly increases the rate of spread of these diseases. E. coli and Salmonella also emerge as secondary infections following immune-suppression and poor sanitation resulting from wet conditions. Under a free-range system the diseases occur due to; uncontrolled exposure of birds to the environment, absence of housing and lack of routine vaccination. The common symptoms of these diseases include breathing difficulties, loss of appetite, depression, infection of the umbilical stump (omphalitis) and low growth rates. To manage the diseases farmers should; orally administer broad-spectrum antibiotics, include general sanitation protocols, execute biosecurity measures and avoid feeding birds with contaminated feed.

4. Fowl pox

The pox is highly contagious and it affects poultry birds at any age. It is caused by a poxvirus transmitted by blood-sucking insects mostly mosquitoes. The disease is prevalent during the wet season because of the high frequency of vector insects. Fowl pox attacks the skin and surfaces of both the upper alimentary and respiratory tract leading to the formation of wounds that progress to be thick scabs. Secondary infection of the pox results in birds being weak and emaciated due; to loss of appetite, difficulty in swallowing and breathing, swollen eyelids which lead to closure of one or both eyes and soiled feathers. The infection has no treatment. Farmers should; vaccinate healthy birds to prevent them from this disease, discard stagnate water and destroy all mosquito habitats and isolate or culling of infected birds to remove the source of virus

For more information in bird health contact call/ WhatsApp +263 776 420 161 or email gbmundida@gmail.com

Drones for Land Prep, Planting and Post Emergence

By Tawanda Chihambakwe Drone Consultant, Director Precision Aerial Group

For farmers across Zimbabwe, land clearing, preparation and planting is well underway for the summer cropping season 2023 - 2024. The focus on the minds of farmers is how to ensure higher productivity whilst battling challenging conditions driven by climate change and a difficult operating environment.

The benefits of adopting climate-smart agriculture tools and practices cannot be overstated. With a predicted El Nino Phenomenon expected in the 2023 – 2024 Farming Season, the use of tools like drones for precision agriculture is paramount. While drought is the main threat to food production, El Niño can also cause heavy rains, flooding or extremely hot or cold weather. In any case, crop monitoring and crop protection must be done accurately and swiftly to counter the effects brought about by El Nino.

How can drones help?

Using drones offers several advantages in agriculture. They help farmers to collect high-resolution data on planting efficiency, post emergence crop health, soil moisture, and other key metrics. This data can then be used to make informed decisions about planting, fertilisation and optimise crop management enabling farmers to identify potential issues early on and take action before they become serious problems.

Land Preparation, Planting and Post Emergence

During the planting phase, farmers must ensure that their land preparation is done properly. We use top of the range **Crop spraying drones** to spray Herbicides like Glyphosate (Roundup) to clear the land of weeds, residual crop roots, stems from winter crops or from the previous summer cropping season. With the use of spraying drones, you can spray a 10-hectare area on your farm in less than 60 minutes. Spraying with drones is also a great method of conserving water (up to 80% less) and chemical use (5-10% less). Drones can cover large areas of farmland in a short amount of time. This means that farmers can quickly identify areas that call for attention.

Drones are also used to get the topographical layout of the farm for better planning. **Mapping Drones** equipped cameras, sensors, and other advanced technologies fly over farmland and capture high-resolution images that are used to create 2D and 3D maps to help farmers understand the farm terrain. These high resolution maps make it easy to identify gaps left during the planting process including areas that are bare and where crops may not have germinated properly. Drones are versatile in capturing detailed images of crops, including their height, density, and growth rate.

We also deploy drones to dispense fertilisers and foliar sprays to help crops grow. This is achieved using a detachable spreading system on the drone which has a disc at the bottom and can spread over 50kg in 5 mins. By using drones to spray, spread and collect data, farmers can reduce the need for manual labour and costly equipment. Drones can cover large areas quickly and efficiently, making it easier for farmers to manage and monitor their crops.

Precision Aerial, the first commercial ROC holder for Agriculture applications in Zimbabwe has been working on developing and deploying drone technology for agriculture in the country and around Southern Africa for several years. We have worked with local farmers to develop a drone-based farm mapping system that has improved yields considerably by removing the guess work in farming and using data and technology to reduce waste. Our drone services have helped farmers identify areas with low soil fertility and low crop count leading to more targeted fertilisation, better planting regimes and higher crop yields.

Many farmers in Zimbabwe have begun to realise these great benefits and have started purchasing their own drones. The use of drones in Zimbabwe is strictly guided by S.I 271 of 2018 Civil Aviation Remotely Piloted Aircraft Regulations and farmers should only engage licenced companies (ROC holders) for services.

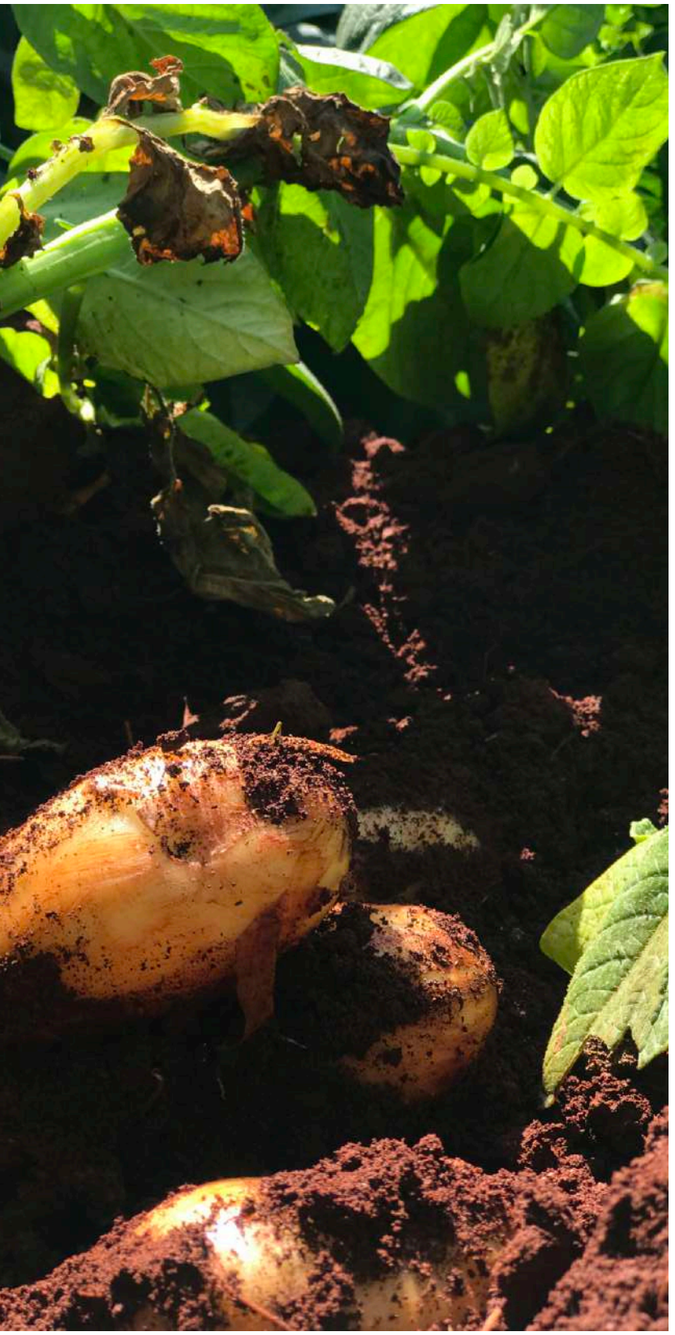
Our commitment to innovation drives us to deliver ground-breaking solutions that elevate your farm's productivity and profitability.

If you have any inquiries or wish to explore our solutions, contact us directly at +263719489139 or via email at zimbabwe@flyinglabs.org . To view our catalogue, visit our website at www.flyinglabs.org

Have You Had Heavy Rains, Hail, And Strong Winds?

Boost Your Plants Recovery Post Stress Periods

By Damara Bio Agri



Cloud cover, a plants brix levels, and its photosynthetic capabilities are tied together in a complex web of interaction. The aim of this article is to get to grips with understanding how a plants energy, ultimately their brix level, is impacted because of prolonged cloud cover, heavy rains, hail and strong winds, and how this influences the plants natural process of photosynthesis. We will then discuss how Plantsure, an organic plant derived product, available at Damara Bio-Agri can help to boost your plants recovery post stress periods.

First and foremost, let's understand more about Brix;

"The sugar levels in a plant are like a gauge of photosynthetic activity. They are also a gauge of the health of the plant; the **higher the sugar levels, the healthier the plant."** Brix is the measurement of sugar levels, vitamins, minerals, proteins, and other solid content in plants and is measured using a refractometer. When a plant has a high brix level it is an indication that the plant has been grown in a healthy medium, with sufficient nutrients and water. The plant has the capacity to build essential oils to protect itself from pests and diseases functioning at an optimal level of photosynthesis, turning light into yield at its maximum capacity.

Low Brix (sugar) values in plants means poor nutrition and signal a weak plant. Weak plants attract pests and diseases. When a plant has deficiencies, it consists of simple sugars and incomplete proteins that are natural attractors of pests. This plant will tend to photosynthesise less, during which time the plant is not able to efficiently use the energy input from the sun to absorb carbon dioxide from the air, and water from the soil, to produce the necessary sugars and carbohydrates that coincide with a high yield. However, if you have a healthy plant with a high brix level, a pest, for instance, will not be attracted to the plant and will thus go elsewhere.

This is where the effect of cloud cover is most prominent on crops. If you think about it, Zimbabwean summers are characterised by hot sunny days only alleviated by the cool afternoon thunderstorms. Although we all wait in anticipation of rain, have you ever given thought to how those thunderstorms impact a plants energy level? Firstly, have a think about what constitutes a thunderstorm. The answer to that is clouds! Not only when a thunderstorm is building, but also after a thunderstorm, there tends to be an increase in cloud cover. This increase in cloud cover can persist for hours if not days. Thus, if your crop is already failing to photosynthesise optimally, as a low brix level would highlight, because it has not had access to the correct soil nutrition, persistent cloud cover would only serve to disturb the process of photosynthesis even further. This will have a detrimental impact on the overall crop performance, where studies have predicted that this costs plants 7.5 to 40% of their yield, depending on the type of plant and temperature.

Compounding this issue is the fact that when a plant faces abiotic stressors such as heavy rains, hail or strong winds, as we typically experience in our summers, the sugar levels of that plant further decrease, ultimately meaning plant health decreases. When plant health decreases the plant becomes more susceptible to pests and diseases which can become rampant post stress periods. This is why boosting your plants recovery post stress periods is so important.

There's only one way to boost your plants recovery = **Increase Brix Levels**

So, how can we do this?

Building a core foundation is always going to be the most important way to maintain a high energy and healthy plant. However, when we are faced with the challenge of increasing a plants photosynthetic rate post stress periods we've got a solution at Damara Bio-Agri called Plantsure. Plantsure is an organic product derived from natural plant material, consisting of L- Amino Acids, Organic Acids and Phytohormones. Plantsure is a product that has been proven to increase Brix (sugar) levels in plants. With growth promoting auxins and cytokinins, resistance inducing organic acids and the purest form of amino acids that can be readily absorbed by the plant, Plantsure stimulates overall plant health and increases plant immunity.

Using a product like Plantsure to increase your plants photosynthetic rate and ultimately the Brix level of that plant will offer various benefits:

- Increased resistance to pests and disease
- Improves plants recovery post stress periods
- Increases general plant health
- Plants with a higher Brix level will not rot and mould as easily

Readily available in 1L, 5L and 20L containers and suitable for use on all crops.

Please note we also have refractometers available at Damara Bio-Agri that can be used to measure the Brix (sugar) levels of your crops on farm.

If you would like to know more about Plantsure or Refractometers please get in touch with us at sales@damarabioagri.com or 08677005277.

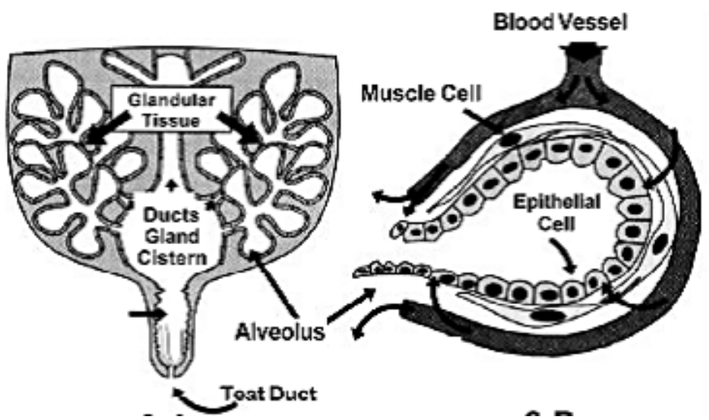
Dealing with Mastitis

By James Kabinda, Animal Production Specialist

Mastitis is a clinical condition whereby a cow ceases to produce milk due to inflammation of the udder. The inflammation of the udder is caused by microbes (mainly bacteria) found on the cow, its udder, the environment, the floor, faeces, soil and water, and parlour machinery. The disease leads to decrease in milk output and an increase in the somatic cell count (SCC) of milk which compromises milk quality.

The Structure of the Udder

Understanding the anatomy and physiology of the udder is key to understanding how mastitis develops. The interior of each quarter is composed of a teat cistern, gland cistern, milk ducts and glandular tissue. The glandular tissue or secretory portion contains millions of microscopic sacs called alveoli. Each alveolus is lined with milk-producing epithelial cells and is surrounded by muscle cells that contract and squeeze milk from the alveolus during milking. Blood vessels bring nutrients to each alveolus, where epithelial cells convert them into milk.



How Mastitis Develops

Mastitis results from exposure of the udder to bacteria. The bacteria pass through the teat duct and multiply in milk-producing tissues. Microorganisms breach the teat duct in several ways. Between milking, microorganisms may pass through the teat duct by multiplying inside the duct, or by physical movement resulting from pressure placed on the teat end as the cow moves about. During machine milking, microorganisms may be impelled into or through the teat duct into the teat cistern. The potential for invasion is greatly increased by bacteria that reside in or colonise the teat duct. Such colonisation occurs in lactating and dry cows, and the colonising bacteria may survive for months, serving as sources of bacteria for infecting the gland. The practice of dipping teats with an effective bactericide before and after each milking greatly reduces teat duct colonization.

Signs and Symptoms of Different Forms of Mastitis

Mastitis can be categorised as follows; peracute, acute, subacute or clinical, subclinical, chronic and gangrenous. All these forms of the diseases differ in the severity of signs and symptoms.

a. Peracute - This form of mastitis is characterised by, swelling of the udder, heat, redness, pain, disturbed function, fever, depression, shivering, loss of appetite and rapid loss of weight.

b. Acute - Symptoms of this form are similar to the above-mentioned including fever and mild depression.

c. Subacute or clinical – It is characterised by swollen udder and milk clots.

d. Subclinical – The cow appears normal, without fever, heat or visually abnormal milk. Milk production decreases by up to 10% and this form can only be detected by tests on milk.

e. Chronic - With chronic mastitis the inflammation persists from one lactation to another.

f. Gangrenous - This is the most severe form of the disease characterized by necrosis of the udder tissue. The udder turns black and cow is severely ill.

Control and Prevention

Designing a mastitis control program is pivotal in any dairy production system. The control program must be practical, easy to understand, highly effective in most dairy herds, increase economic returns, reduce new infections, shorten duration of existing infections, provide tangible evidence that clinical mastitis is reduced and be easy to modify in case of new development.

Treatment of Mastitis

Treatment can be done by antibiotic therapy for clinical cases. Subclinical cases must be controlled through correct management practices. Antibiotics that can be used include; Cloxacillin, Streptomycin and Penicillin. Cloxacillin is the only drug with no known resistances. Infected animals must be sampled and tested for specific type of the causative pathogens.

Drug application - First milk out into a bucket, followed by intra-mammary dosage of antibiotic as recommended by the drug manufacturer. If the cow fails to respond well within 2 days, change drug. Acute and peracute cases nurses along with treatment. Consult a vet in your area for proper drug administrations. Mastitis remains a complex disease and its management is an increasing challenge when many studies have been made in an attempt to describe fully the extent and nature of this problem. It is pivotal for industry role players to impart knowledge to rural cattle holders such that they are equipped with the tools to prevent or manage the disease. Prevention is always cost effective than treatment.

Management Task	Specific action
Milking hygiene	Milk teats that are both clean and dry
Milking machine	Stabilize milking vacuum before removal
Post milking teat dipping	Immediately after removing cups. Immerse teat in iodine at least ¾ of the teat.
Pre milking teat dipping	Before inserting cups on the teats. Immerse teat in iodine at least ¾ of the teat.
Drying off	All quarters of the udders of all cows after last milking.
Treatment of clinical cases	Early detection and treatment, maintain records.
Culling	Cull chronic cases.
Environment	Clean and dry, uncrowded and well ventilated.
Herd replacements	Test new animals before adding to the herd. Check new animals regularly.

James Kabinda is an Animal Production Specialists with a degree in Animal Production and Technology from Chinhoyi University of Technology. For more information call 0774225873, or email: jameskabinda@gmail.com

For more information on Mastitis in Dairy Cattle refer to an article by Eunah Makoni, MSC, MBA. ABS TCM (Pvt) Ltd on ZiMunda Farming Issue 14.