TECH BULLETIN

EDITION 1 - DECEMBER 2017

Technical Services, Syngenta South Africa

SmartFarm Inspired

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First and certainly not the last

The Tech Bulletin is produced by the Syngenta Technical Services department with the aim of keeping our customers informed and up to date with current trends and developments in agriculture with a specific focus to cover technical related topics before and during the season. It is also a platform that can be used to share some of the great demonstration trials done by our Sales Promoters. Please don't hesitate to contact us if you have any specific topic that you wish should be covered in future editions.

"The continued development of the sustainable intensification of agriculture is essential in maintaining the future quality and supply of agricultural products, while respecting the integrity of the land and the people who work it."

*- **Romano DeVivo,***
Head Environmental Policy
Syngenta

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Fall armyworm on maize - see page 5 for more information

In this issue

1 The influence

of water quality on pesticide applications

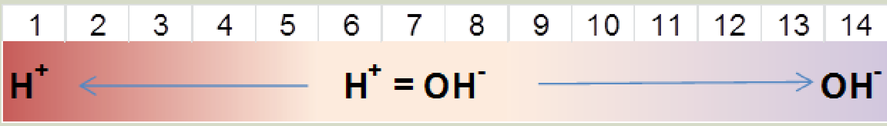
By Francois Viljoen

Various factors play an important role in the stability and effectiveness of pesticides. One of the most important aspects, which is often overlooked, is the impact of water quality used for preparing the spray mixture. Water comprises ninety-five percent (and even more) of the spray solution. Research has repeatedly indicated that unsuitable water can have a negative effect on pesticides and foliar feeds, resulting in less than desirable results. Three characteristics of water play an important role during application: water pH, water hardness and suspended solids or organic matter. In this Technical Bulletin we will explore these three topics in more detail.

Water pH

Water pH is a measurement of the H+ ion concentration in the water. As the number of H+ ions increases in water, it becomes more acidic. The opposite is true for alkaline water, where the H+ ions decreases and OH- ions increases. Water with a lower H+ ion concentration therefore becomes alkaline. A pH of 7 is considered neutral, less than 7 considered an acid and above 7 an alkaline (base).

Water pH is measured on a **logarithmic** scale of 0 to 14. It is important to remember that a pH of 5 is therefore 10x more acidic than a pH of 6 and 100x more acidic than a pH of 7, suggesting that a small pH change can represent a huge change in acidity or alkalinity.



Stability of active ingredients (a.i's) and formulations are greatly influenced by water pH. Water pH higher than 7 creates alkaline conditions, and can lead to the degradation or chemical breakdown (hydrolysis) of pesticides. Alkaline mixtures like this can also lead to chemicals forming a sludge at the bottom of the spray tank. Additionally, strong acidic water can also lead to hydrolysis of some ai's.

Refer to the below picture of a recent case of severe sludge development in spray mix where the water used had a pH of 9.5.

An optimal range for most products is at a pH of 3.5 – 6.0. When the pH reaches 6.0 – 7.0, it is advised to spray immediately after mixing and to avoid leaving the mixture in the tank longer than 2 hours. When pH levels are higher than 7.0 a buffering agent must be added. As an example, Mesotrione starts to decompose via cyclisation at a pH>4, and becomes unstable in neutral and alkaline conditions. Always consider the water pH when applying pesticides and adjust the pH using a suitable buffer.

Water Hardness

All water sources contain dissolved minerals such as calcium, magnesium and iron. These minerals do not settle in water, unlike suspended solids. Minerals in water are also responsible for the "taste" of the water. Calcium and magnesium dissolved in water are the two most common minerals that make water 'hard'.

Water hardness is expressed as the amount of calcium and magnesium ions in the water. The higher the concentration, the harder the water. Water becomes soft when calcium and magnesium ions are replaced by sodium and potassium ions. Water hardness is measured in parts per million. Table 2 indicates hardness concentrations.

Parts per Million (Ca and Mg)	WHO water classification
0-114	Soft
114-342	Moderately hard
342-800	Hard
>800	Extremely hard

Pesticides are charged negatively, and bind to the positively charged ions in hard water. This interaction results in molecules that are unable to enter the target, enter the target at a slower rate, or precipitate out of solution. The addition of adjuvants such as ammonium sulfate when applying Glyphosate enhances the efficacy of the product as it binds with the ions preventing an unwanted interaction with glyphosate. Water containing calcium and magnesium can reduce the effectiveness of glyphosate, 2,4D Amine, fluazifop, MCPA as well various insecticides and fungicides. It is also very important to note that there is no correlation between water hardness and pH, and that both problems should be approached separately.

Suspended solids

The turbid color of water usually indicates high amounts of soil particles and / or organic matter. Presence of soil particles and organic matter in water is referred to as turbidity, or turbid water. Some pesticides are more sensitive to turbidity than others.

An important property of some pesticides is the ability to bind to soil particles. This is an important indicator when considering leaching of chemicals. Soil sorption coefficient (Kd) and soil organic carbon sorption coefficient (Koc) are indicators of how strong a pesticide will bind to soil particles and particles suspended in water. Herbicides with high Kd and Koc bind more tightly to soil particles in water. Water containing soil particles and organic matter are known to deactivate herbicides containing diquat (Reglone), paraquat (Gramoxone) and glyphosate (Touchdown). Clean and clear water should always be used, especially when applying the above mentioned products.

Summary

Always be sure to use the cleanest and clearest water available for mixing pesticides. Water pH plays a major role in pesticide efficacy and must be adjusted as needed. Regular testing of water resources is recommended to ensure that high quality water is used and application problems are avoided.

Initiative

1 **The Syngenta Technical Department is also starting an initiative to test for product compatibility, formulation stability and pH effects in collaboration with our Syngenta Quality Control laboratory in Brits. More details on this initiative will be communicated soon.**

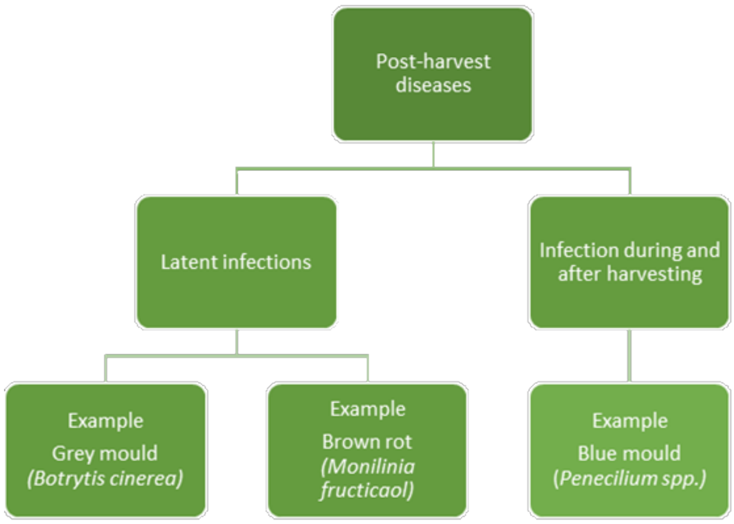
2 **Further, mobile pH meters will also be made available for our customer facing colleagues for in-field testing and an improved customer experience.**

2 Teaching post-harvest diseases a lesson

By Adri Anthonissen

Diseases causing rotting and spoilage of fruit after harvest and storage, termed post-harvest diseases, can have a devastating effect on crop value, with losses not just in spoiled fruit but also lower quality grading and lower prices.

Post-harvest diseases can be classified into two major groups, diseases with latent infections and diseases which infect during and after harvest, as indicated in the graphic below.



Latent infections usually take place pre-harvest and fruit show no visible signs of infection when harvested and packed. These disease only develop once conditions and/or fruit development is optimal. The dramatic physiological changes that take place during fruit ripening is often the trigger that sets disease development in motion.

Infections that take place during and after harvest are usually associated with physical damage to the fruit, however some pathogens can infect through natural openings in the fruit surface as well. The wounds through which these infections take place can be very small and may not be visible to the naked eye. It is crucial that damage to fruit be avoided at all stages of the harvest and storage process.

Many post-harvest pathogens produce millions of spores on the surface of the infected fruit and can cause secondary infections during storage.

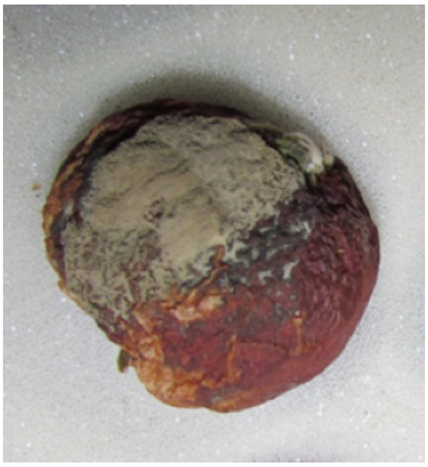


Figure 1: *Botrytis cinerea sporulation on the surface of a peach in storage.*

Post-harvest diseases can be managed by a good pre-harvest control program as well as good sanitation and temperature control during and after harvest, however an effective post-harvest fungicide is an essential part of a good integrated disease management strategy. Post-harvest treatment of fruit with fludioxonil containing products like SCHOLAR® are highly effective in controlling a broad spectrum of post-harvest diseases.
The fludioxonil in SCHOLAR® inhibits spore germination as well as mycelial growth and it also limits the sporulation of the fungus on the surface of the fruit thereby limiting secondary infections.

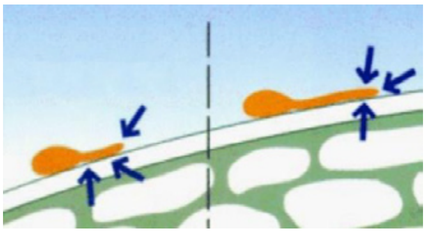


Figure 2: *Diagrammatic representation showing the target mode of action SCHOLAR® has on fungal germination tubes on contact.*

During the 2016/'17 summer season Larissa van der Vyver (Syngenta Sales Promoter in the Western Cape area) did a test in the Robertson area to see how long peaches stayed fresh when treated with SCHOLAR®.

These peaches where treated with SCHOLAR® at label rates using dipping treatment and then inoculated with Botrytis cinerea. The fruit was stored at a constant temperature of 23°C. After 7 days the treated fruit showed no disease development while the untreated inoculated control showed a 73% infection.

At 21 days after treatment and inoculation, 20% of SCHOLAR® treated fruit still showed no diseases development, while the untreated inoculated control showed a 100% infection. It is important to remember that 100% of treated fruit was inoculated with the disease. Pears treated with SCHOLAR® with label rates using dipping treatment and inoculated with Botrytis cinerea showed no disease development after 21days, while the control had 100% diseases development

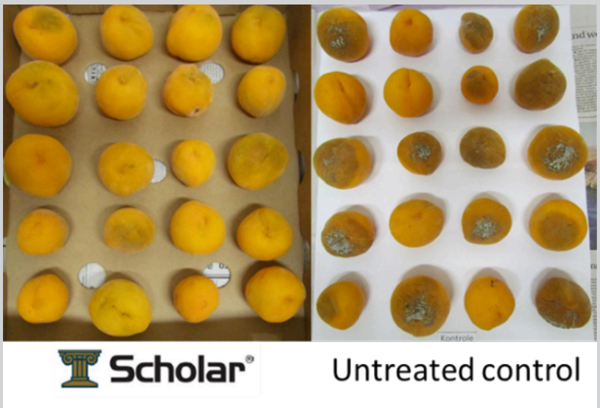


Image 1: *SCHOLAR® vs untreated control infected with Botrytis cinerea 7 days after harvest*

Image 2: *Pears treated with SCHOLAR® vs untreated control. Both treatments were inoculated with Botrytis cinerea. 21 days after harvesting the pears treated with SCHOLAR® showed no symptoms while the untreated showed 100% infection levels. This trial was done by Zoe Bredell (Syngenta Sales Manager, Western Cape) during the 2014/'15 season.*

What does SCHOLAR® bring to the packhouse?

- The product is stable in wide pH range of 5 – 9
- Provides excellent broad spectrum control of post-harvest diseases with a good safety profile with EPA certification
- Suitable for all application methods used in pack houses including drips, drenches and sprays

Disclaimer: READ THE LABEL FOR FULL DETAILS SCHOLAR® contains fludioxonil 250g/l (Reg. No. L8578, Act No. 36 of 1947).

Fall Armyworm
What's new?

By Andreas Boon


Photo credit: Johan Dreyer

Presence of Fall Armyworm in Africa

Since this lepidopteran creature made its move from the Americas to Africa, it caused havoc and destruction as it spread through Africa. The first reports of Fall Armyworm (Spodoptera frugiperda) (FAW) on the African continent were received early in 2016 from West and Central Africa. Since then it has spread over the continent and by the end of 2016 it was reported in Zambia, and early 2017 in Limpopo, South Africa. FAW now occurs in all the countries shown below.

Presence of Fall Armyworm this season

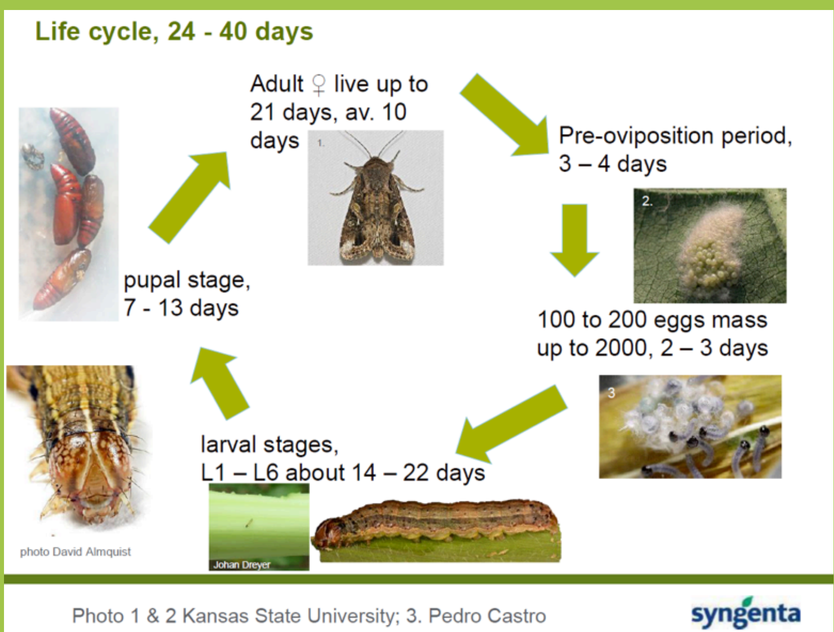
The November 2017 South African FAW Steering Committee meeting, attended by Desiree van Heerden, reported recent FAW occurrences in the following locations in South Africa:

- Makatini flats (groen mielies)
- Limpopo
- Komati areas (throughout the winter)
- Schoemanskloof (sweetcorn)

The late rains certainly has had an impact on later observances, but we expect more new flights within the coming weeks.

Initiative

The Syngenta Technical Department created a Syngenta FAW WhatsApp group for the purpose of reporting any new sightings and to share relevant info. Please feel free to share information on this platform as soon as you become aware of anything new.



Fall Armyworm has a quick lifecycle, anything from 24 to 40 days from eggs hatching to adult moth. The length of the lifecycle is strongly influenced by factors such as temperature. Although there is still quite a bit to learn about the optimal temperatures on the African continent, it is clear from literature from the US that the lifecycle is shorter during warmer conditions and longer during colder conditions. In Malawi it was reported that more severe attacks occurred in Blantyre region than Lilongwe due to different climatic conditions. An adult moth can lay anything from 50 to 250 eggs per mass and up to 2000 during her lifetime. Since the moth can travel up to 100 km per night, it can quickly spread to new areas, and as it continues to lay eggs an epidemic can soon occur. Please refer to the life cycle on the left.

(credit: Desiree van Heerden)

We hope to elaborate a bit more on the factors influencing FAW lifecycle in a follow up edition.

Treatment
of the pest

Photo credit: Johan Dreyer

It is clear that FAW is here to stay. It is therefore crucial that farmers scout regularly (every 3 days) to detect if the pest is present in fields as early as possible. Eggs masses can be found on both maize leaf sides, mostly on the underside. It can also be found on the stem. Larvae can be found feeding on any part of the maize plant. It is difficult to identify FAW larvae at 1st and 2nd instar stages, as they can still be confused with other pests. It is from later instars that FAW can be identified by the upside Y mark on the head region and the four larger spots on the second last segment. *(See the picture below.)*

Fall armyworm characteristic marks. D Visser ARC-VOP Roodeplaat

The best control results will be achieved when pesticides are applied early during the FAW lifecycle. This is once the first egg masses have been observed or when larvae are still small and less than 10% of a field is infested. It is important to rotate registered insecticides with different modes of action as the pest quickly develops resistance to insecticides. Certainly counting in South Africa's favor is the availability of BT maize traits which is a great tool that obviously needs to be managed well.

The Syngenta insecticides currently registered for controlling FAW are **AMPLIGO®, SORBA® and PROCLAIM®**

Disclaimer: AMPLIGO® contains Chloorantraniliprool 100 g/L and Lambda-cyhalothrin (pyrethroid) 50 g/L (Reg. No. L8685, Act No. 36 of 1947).
SORBA® contains Lufenuron 50 g/L (Reg. No. L5343, Act No. 36 of 1947).
PROCLAIM® contains Emamectin benzoate 50 g/kg (Reg. No. L7581, Act No. 36 of 1947).
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