July 14, 2018

SO FAR, SO...

Anasazi Agronomy Newsletter—

In this issue:

Season 2018—little late, but perhaps a little good?

One amazing fact we can't ignore-a decent break means ALL pre emergent chemicals had their best chance of working, paddocks that were left for a knockdown achieved terrific results and whilst it remains slightly drier than normal, traversing over paddocks has not been a massive issue; for most of us anyway!!! Still, there are a few anomalies as ever, and indeed leads us nicely into what the expectations for the next month-6 weeks looks like, as well as taking stock of what we've noticed so far?

Borrowed from Twitter

(thanks Travis!)

Where are we at so far?

Once again alluding to the fact that the break rainfall was generally very even across all of where I go, it means EVE-RYTHING is very SIMILAR everywhere!!

In terms of the regular weed issues, the one that has been around with the normal regularity is ryegrass. It's very handy that we've had a year like this for the first year debut of stand alone prosulfacarb; and I can assure you all that the conditions we've had until about this week have been PER-FECT to assist the molecule do what it can to assist our use of it! In fact, there hasn't been such an extended window of great conditions for the post emergent use of Boxer Gold that I can recall?

There is a distinct LACK of radish-but this has more than been made up for with cape-weed, doublegee and water weeds, both cotula and crassula. I feel, like with Brome and Barley grass, that there is a cold dormancy profile of weeds that just hasn't had the correct trigger soil temperatures to make them germinate? Perhaps they're still to come, but we can already see the end of July, and there is a forecast for ONE frosty morning...very unusual.

Another fairly unusual facet of these slightly warmer than normal temperatures is the germination of some spring species-largely sowthistle. This has allowed us to get some of these numbers under control though, although only in cereals generally? Atrazine seems very weak on any sowthistle of size, and glyphosate just doesn't seem to work at all...thankfully, Gr B and I seem to be doing the job and definitely controls the small-er ones. It'll be interesting to see if clopyralid does anything, though I fear at the low rates we're using to assist atrazine or glyphosate control capeweed/clover/vol lupins with, it isn't likely?

INSECT EXPECTATIONS

Furthermore, the warmer weather has led to a few problems with insects - largely Lucerne Flea and Red Legged Earth Mite. The latter tends to only hatch once sufficiently cold temperatures have occurred, and it was thought that this would be prolonged over a week or so? However, we had ONE cold morning on the Saturday after the break rainfall event at the end of May, and it would appear that this was enough to get the little critters going. Couple this with the late September rain last year, which would have assisted the females back then to maximise their opportunity for egg laying, and we have this year's perfect storm.

Lucerne Flea are slightly different, in that the hatching is generally determined by moisture levels in silty soil, which is where the females lay their eggs. She will coat the egg with a certain layer of silt - the size of which is fairly haphazard, as is quite where in the profile she attaches the egg to the soil, hence the extended hatchings we tend to see.

There is little doubt that both of these insect populations are driven by warmer temperatures to complete their life cycles quicker - and indeed, the same came be said for aphid. Of late, however, there has been a general lack of aphid populations, but I did notice a few cabbage aphid on early to establish bits of canola south of Shackleton a month ago. I also saw a few different ones (maybe Green Peach Aphid?) in some succulents at home before they were sprayed...but other than that, it's been pretty quiet on the aphid front. I'm sure that'll change pretty darn quick though!

There is a little concern however, when it comes to Soybean Dwarf virus, the red clover syndrome that decimated pastures last season throughout much of the western and central wheatbelt. In the last week (according to UWA researcher Dr Kevin Foster) there have been a few samples submitted to the lab for identification. So far, all of these samples have returned negative results for the virus, but I took some samples last Friday that look a little suspicious?

Photo 1, showing some affected red clover plants, and some unaffected (as yet?)

As yet, we know SO LITTLE about the transfer of the virus to host plants...we do know that it is not seed borne, so that is a big bonus. We do not, however, have any real tangible proof on what is the vector, never mind what the range of host species might be for it either? It is interesting that the latest research into the vectors pointed a large and damning finger at aphid - but little is known to confirm which aphid, or if there are other players involved in the mix. Whilst we had a reasonable warm start to the season, we had many paddocks spring to life with clover and capeweed, and of course because we had RLEM and Lucerne Flea, and we were targeting early weed pressure as well, there are several paddocks that have been sprayed with an anti feed already.

This, coupled with the very decent lack of green bridge in most areas, meant that the primary vector (aphid) should be in extremely low numbers. Hopefully this is the case, and what we're seeing is either something nutritional or another root pathogen or something OTHER than Soybean Dwarf virus, as we will quite seriously be back to the drawing board on this...that and the fact that neither AWI or MLA are prepared to further any finances to any ongoing research into this issue, and we could have a little calamity in the making.

DISEASE EXPECTATIONS

It's easiest to start this by thinking of cropping, given we've just gone through a disease of clover pasture!

So, first and foremost - **CANOLA**, and there are 2 diseases to be concerned about which are Blackleg and Sclerotinia.

1. BLACKLEG

As you may (or may not?) have noticed, blackleg risk - and severity - is very high. The reason isn't too difficult to understand. Blackleg is more like a race of fungi, like we are the human race. So, like many people have a particular favourite carbohydrate (Asian people like rice, Africans like maize meal, Irish like potatoes, us Australians like beer?) so Blackleg is similar - there are races that like Hyola 404RR, which is similar to 43Y23...and also similar to Bonito. When there is A LOT OF YOUR FAVOURITE FOOD, certainly as a fungus, your population explodes. As a consequence, we see a lot more sporulation despite more fungicide use and less acres actually seeded to canola - simply due to similar 'food styles'. Whether we can see a notable difference when spraying a foliar fungicide for Blackleg control or not is nearly irrelevant. As is the case with all fungal species, they evolve very quickly, and there are MASSIVE numbers!! We are in danger of over reliance on chemical control, and evolution is in action...ATR Mako is the heir incumbent to the TT throne, but is the same genetic suite for Blackleg resistance.

In the current yield prospects for ANY canola through our neck of the woods, the economic consequence for NOT treating Blackleg occurrence this year is not a decision that needs much thought. However, we REALLY don't need nor can we afford another Blackleg breakdown...so I guess in some situations it may be beneficial to treat the crop, but for MOST OF YOU - watch this space!

2. SCLEROTINIA

The risk of the economic consequence of this fungus this year is very low. It's not to say that it won't be seen, or in some certain situations be beneficial, but generally it is very unlikely to be of much concern.

This is largely due to the fact that it is very dependent on spore release onto just dying flower petals, though as we've seen in 2016 it can grow along saturated soil in the form of mycelium that can then infect the plants at ground level. As we saw (or perhaps only me and a select few?) back then, the fungus doesn't *really know or care* what stage the crop is at - if conditions are good for growth, and there is enough energy in the organic matter surrounding the actual food source - it will grow fairly freely, and invade new food source at will. This could be considered Step One.

Thankfully, there are not too many areas with sclerotia (the funny little rat poos) in the paddock to germinate and cause this concern this season. So, Step One is a none event.

Step Two is when we have a sufficient canopy to develop the sclerotia to form apothecia (the little golf tee shape mushrooms) and then maintain them long enough to spew spore into the atmosphere. The infected petals then drop onto wet leaf, and that provides the energy and the food source for the fungus to grow. This could still very well happen during August - and secretly, I hope we DO see the development of the fungus, as it then means we're wet enough to get a decent yield!! I still maintain though, we will not be wet enough for the majority of you to spray for this event.

Secondly, **BARLEY**, and really it's net blotch (both net form and spot form) and powdery mildew.

3. POWDERY MILDEW

There is only really Bass as a variety left in our suite that is still susceptible to Powdery Mildew. The strain of PM that is most abundant is tolerant to tebuconazole (e.g. Folicur) and also Jockey (difenoconazole). This does not infer a cross resistance to propiconazole, but it isn't far off? THERE IS NO RESISTANCE ANYWHERE ON EARTH to prothioconazole - which is contained in Prosaro, nor is there resistance to some SDHI and QoL (strobilurins) - HOWEVER, the SDHI group and QoL are best used for PM as a PROPHYLACTIC spray!!! This means using the chemical BEFORE we see sporulation, or the onset of disease.

They are not great as curative, nor eradicant measures. Conditions of late - certainly the last 2 weeks - have been IDEAL for the development of PM. IF THERE IS NO SIGN, and we really need to mix up action groups, then this is the time to administer the low end of the label dose. IF you're looking to apply nitrogen as UAN, don't use these products! They are very likely to cause crop damage - so rather use a high end of the label rate of propiconazole, and look to come back with a close to high end of the label rate of the different group of chemistry in 3-4 weeks time.

DISEASE EXPECTATIONS

4. NET FORM NET BLOTCH

Like with Powdery Mildew, only RGT Planet, Litmus and Bass are likely to get Net Form of Net Blotch. Thankfully, on this side of the continent in any case, we don't have any issues with DMI (triazole) chemicals doing the jib. Net Form moves a little quicker than Spot Form - so if you have a bulk up crop of Planet, or are contemplating something with Bass or Litmus, hopefully it is close enough to Z31 (first node) to pull the trigger. Otherwise, wait for the next 7-10 days and you'll beat that point anyway!!

5. SPOT FORM NET BLOTCH

The majority of our barley is Spartacus or Scope. And for very GOOD reason - not only have they got the Clearfield back door option, but they almost EXCLUSIVELY are only susceptible to Spot Form Net Blotch...as well as Loose Smut, BUT that should've been addressed with a decent seed dressing!

Again, this side of the continent we are blessed with little known resistance to the most common (and cheap!) forms of chemical for treatment, but it is aggressive when it's warm and we have blustery showers - cue current conditions!

6. BARLEY LEAF RUST

So far, no cause for alarm in terms of inoculum level, variety and disease pressure. It is THE MOST AGGRESSIVE disease we face, but is far more innocuous when heads are out. A well timed preventative spray - that is probably targeted at a different fungal complex -will take care of our rust requirement.

THE MOST IMPORTANT facet to remember with disease control in barley, oats and wheat is to PROTECT the money leaves and the head/stem elongation part for as LONG AS POSSIBLE!!! None of these are visible yet, and NO CHEMISTRY WE HAVE INVENTED YET can protect those bits until they're exposed. In terms of susceptibility, most barley will require 2 fungicide shots, and I would implore you to consider different mixes of groups of chemicals, similar to attacking weeds.

Thirdly, I suppose - is **WHEAT.**

7. SEPTORIA / STAGANOSPORA

Again, weather conditions have been perfect for the development of this disease. If crop is past Z31, and is wheat on wheat, I'd suggest a spray soon to keep inoculum levels at a manageable level. It is likely that most wheat will require one well timed spray, with a high end fungicide - either a stroby mixture or the newer triazoles (Prosaro, Opus, etc).

8. YELLOW LEAF SPOT

As above, but we have good genetic coverage in many varieties. However, Mace was a sucker and YLS worked it out, and Scepter is only a marginal step in front...conditions have been ideal for this disease to get going, so be forewarned!!! Zen, Ninja, Havoc and Trojan are a good step in front, and will only require one spray if any - but these (Mace and Scepter) will likely require 2, irrespective of rotation.

9. STRIPE RUST

There is a new mutation on the block—and it will impact all our current suite of varieties. However, it has only been identified over east, and only twice in the last 50 years has a rust pathogen made it back this way against the wind!! So, be vigilant when over east, ensure visitors from over east respect our (quite loose) biosecurity and be aware that we're not immune to the evolutionary progress of this disease...as well as stem rust, leaf rust, etc etc.

Carrying on with disease expectations, **OATS**

10. SEPTORIA AVENAE

Purple little blotches on oats leaves - and it once again, has been fungal utopia...and way worse on a rotation of oats, on oats, on oats…

Slightly different to *Septoria spp* in wheat, in that it is inconsiderate of young plant genetics - it will get in where it has the opportunity, and good luck getting it out when established! However, once again, we can (and probably should?) forego early leaves (graze them would be a GREAT idea!) and concentrate chemical control on later leaves...most situations are different though, so be vigilant.

11. CROWN RUST (Oat Leaf Rust)

Almost ubiquitous, late season disease that is one of the MOST AGGRESSIVE fungal complexes we know of! Can only develop when temperatures are above 20°C consistently, and wet leaves/RH above 70% is common...so treatment is usually administered by default, catering for Septoria. This year could be a year where most oat crops would benefit from a fungicide spray, being warmer than normal.

WEED EXPECTATIONS

My thoughts are still that it will get a little colder, and we will see a subsequent germination of radish in cereal crops especially. Whilst we would like to rely on 2,4D sprays, we need to be aware of resistance mechanisms and understand that what has worked previously, may not replicate itself again...perhaps EVER!

There has been some terrific new research conducted at AHRIto understand quite how radish in particular, has evolved to become resistant to auxin herbicides. Group I and more commonly what we refer to as MCPA or 2,4D (both amine and ester formulations) but also includes clopyralid and dicamba.

Below is an excerpt from the most current research at AHRI, by Danica Goggin, and includes previous work by Michelle Owen and the great Professor Stephen Powles.

The paper "*2,4-D and dicamba resistance mechanisms in wild radish: subtle, complex and population specific?" has been published in:* Annals of Botany 2018 online

Authors: Goggin, Kaur, Owen & Powles.

Weed populations with resistance to synthetic auxin herbicides such as 2,4-D and dicamba are occurring worldwide. In Australia, 2,4-D resistance is known in several species but is most widespread in the economically damaging dicot weed wild radish (Raphanus raphanistrum). Despite good efforts by good researchers, relatively little is known about the mechanisms conferring auxinic herbicide resistance. This is due to the great complexity and cascades of effects of auxins on plants.

In an Australian Research Council funded Linkage project with Nufarm as the industry partner, AHRI researcher Danica Goggin combined a transcriptomic and biochemical approach to investigate the diversity of 2,4-D resistance mechanisms in 11 resistant populations of wild radish. All of these wild radish populations had a relatively high level of resistance to 2,4-D and dicamba, although there were differences between populations in the level of resistance.

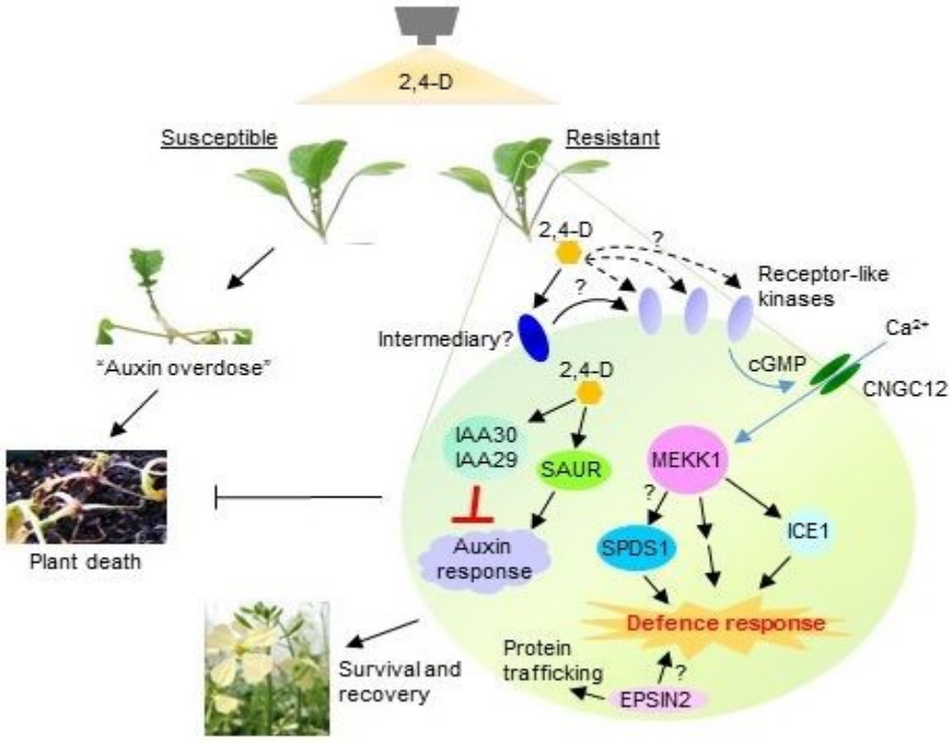
Comparison of gene expression in a susceptible and **one** resistant population in response to 2,4-D showed a large and rapid increase in expression of genes involved in plant defence and immunity (receptor-like kinases, MAP kinase kinase kinase 1) and in dampening of the auxin signal (IAA30). However, generalisations cannot be made because this response was not observed in the other 10 resistant populations.

In some resistant populations, there was very little translocation of radiolabelled 2,4-D out of the treated leaf, indicating reduced 2,4-D translocation as a potential resistance mechanism. However, again, generalisations cannot be made as in other resistant populations there were no differences in rates of translocation between resistant and susceptible plants. Across the 11 resistant populations, there was no correlation between resistance level and the extent of translocation of radiolabelled 2,4-D out of the treated leaf. This, plus differences in auxin selectivity between the populations, highlights the complexity of 2,4-D resistance in wild radish. Early deployment of plant defence responses may be a common factor, as illustrated by a correlation between constitutive phosphorylation (i.e. activation) of MAP kinase proteins and resistance to 2,4-D and dicamba.

WEED EXPECTATIONS (cont'd)

This study highlights the dangers of extrapolating knowledge obtained with one resistant population to generalise about other populations/species. Understanding the mechanistic basis of auxinic herbicide resistance in plants is indeed a very difficult research problem. At least in the species wild radish, 2,4-D resistance appears to result from subtly different auxin signalling alterations in different resistant populations, supplemented by an enhanced defence response and, in some cases, reduced 2,4-D translocation.

Pictorially, we can deduce the following:



Really, REALLY not easy!!

As has been mentioned time and time again, the only way to delay the onset of herbicide resistance is to employ diversity. This means any - and EVERY - tactic, has a fit. Whether it is delaying seeding, attempting new groups of pre emergent chemistry (don't be alarmed, they're coming soon to a cheque book near YOU!) to throwing multiple groups at the populations when they're growing, to harvest techniques - they ALL have a nearly equal fit!

I really think that there is a better opportunity from here on, in terms of weed seed set control, to employ harvest crop topping/swathing, than relying on any shot of selective chemistry. This is certainly not for radish alone, but for grass weeds too. Whilst we have learned a few hard truths about some new chemistry like Sharpen®, the fact of the matter is that well times crop topping with Reglone, Gramoxone or Glyphosate can do a wonderful job for us.

Old work is still relevant, and one of the most important infographics we've come to understand in the last 10 to 15 years or so, is Aik Cheams work on viable radish seed. Whilst we know that practically every radish plant that gets up and going in any given spring time matures at a vastly different rate to pot trial populations, the importance pf understanding WHEN to strike can make a big difference to weed seed set control and management. Overleaf is the pictorial for posterity sakes, but the message is clear striking at stage one (flowering to early pod development) and two (as per the diagram) results in 100% control of that following generation of seed.

Stage 2: Seed is formed but there is nothing inside – just water

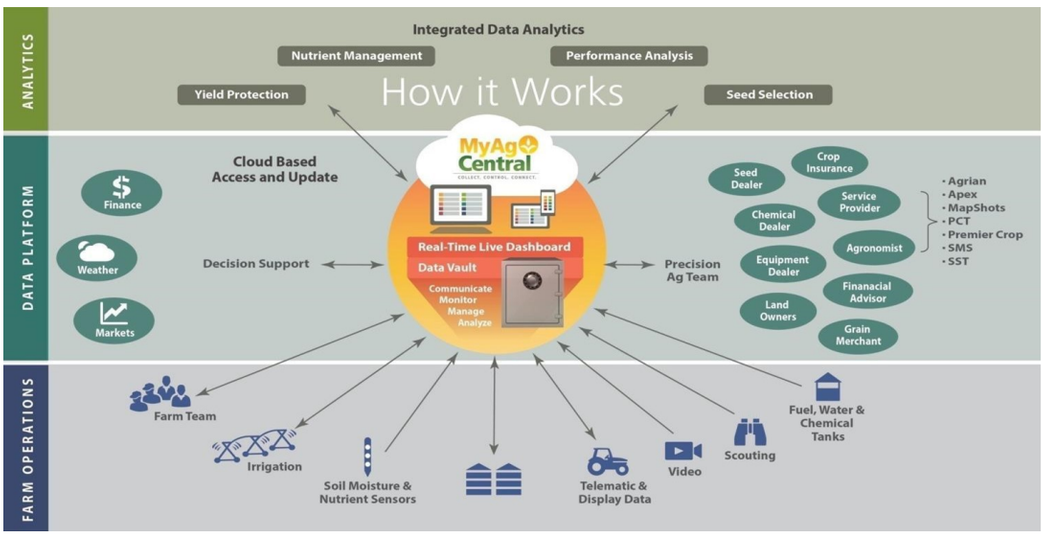
Stage 3: A small, pale green embryo can be found inside the seed

Stage 4: A large, dark green embryo can be found inside the seed

To reiterate, Stage 1 is flowering to early pod development...

Glyphosate can take a while to translocate, and so timing and control may not be as effective as Reglone, and even Sharpen may be SO quick acting it may cause the plant to abort seed pods or indeed burn through the pod stalk and cause the green pod to drop and thereby escape the further progress of the chemical. I have seen control of viable seed units drop below 50% in this instance.

The BIG ISSUE here is one of MRL, and being VERY WELL AWARE of our clean, green image that is so well respected by our markets. You must declare any and all sprays within certain time periods to harvest, and to not do so can be a very costly exercise for you. We as an industry, cannot afford to jeopardise that, so if in doubt...DON'T!



Finally , on TECHNOLOGY, which you all know has been a burning bug bear of mine for 6-7 years now! I believe we are a LOT closer to an agnostic software system, that can and will, accept information from ANYTHING and account for it correctly, and allow us to view different layers simultaneously in order to make better decisions. Furthermore, it will reduce duplicity by allowing single point of entry onto any and all platforms, that can be chronologically stamped and therefore allow a single data vault to host information and deliver reports when required.

One of the challenges is still access to the web. I have had several very positive meetings with Pivotel, and I believe that their EcoSphere is where the next step will take us. We will be trialling the concept at a location east of Brookton, and will be looking at a roll out of different locations and technologies (LoRaWAN, LTE, etc) in due course. Most of these romantic ideals are still just that - BUT I believe these guys are the closest to closing the gap, and having any and all platforms available whenever and wherever you require...which of course, includes your team.

And I am happy to be a part of that team!!

Here's hoping for a friendly August and an even friendlier September...if we're very honest, we can only consider October based on those 2 being fair and reasonable, and I endeavour to put out some other relevant information before then anyway!!

TTFN!

DHS 14-7-2018