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Growth Regulators in Grass and Legume Seed Crops



Red clover seed field in the
AB Peace

Introduction

While plant growth regulators (PGRs) have been used for years on horticulture crops, only in the last few decades has it become more common to use them as a means to improve yield and management of forage seed crops. Research has been conducted both nationally and internationally in order to explore PGR use on cool-season grass and legume seed crops. A three year project exploring the use of growth regulator trinexapac-ethyl on red and alsike clover seed

crops has just been completed in the Peace region. The results of this project are discussed in Seed Head 10 and 11, but, first things first, let's discuss some of the questions that might arise given the relative newness of this topic within the Peace region. While the degree to which we can answer some of the questions varies (and through research projects such as the one recently completed here) we hope to provide some clarity on the subject of PGRs.

For more information:

- A list of articles used to contribute to the above can be found on the PRFSA website.
- Contact Talon (1-877-630-2198) and/or Calvin (780-864-3879) if you have further questions or would like to inquire about participation in any future trials.
- There is a wealth of information on PGRs and grass and legume seed crops on the Oregon State University Seed Production Blog at <http://blogs.oregonstate.edu/seedproduction/>
- Syngenta: 1-877-964-3682
- Engage Agro: 1-866-613-3336

What is a PGR and how does it work?

A PGR is a synthetic compound which stimulates or inhibits the hormonal activity of a plant in order to modify plant development. While different PGRs affect different hormonal activities, the PGRs most relevant to our discussion here (e.g. trinexapac-ethyl [TE] and chlormequat chloride [CCC]) affect the plant hormone gibberellic acid, a hormone which promotes elongation of the tiller. TE

and CCC have been approved for use on various cereal, grass and legume seed crops in many countries around the world. CCC has been approved in Canada for use on spring and winter wheat, while TE is approved for use in Canada on turf type perennial ryegrass (not forage type). Current research being done by the PRFSA is part of the process to achieve further approval for use of TE on other grass and legume seed crops.

What are the benefits of using a PGR?

Using a PGR such as TE has been found to reduce stem length and control lodging in some cool-season grass and legume seed crops. It has also been found to increase seed yield in many instances. Depending on the crop, this increase in yield is thought to be attributed to a reduction in self-shading and an increase in flowering and pollination; and therefore an increase in the number of seeds

produced (as opposed to an increase in the size of the seeds produced). TE may also promote earlier maturation. Furthermore, reduced issues with lodging generally lead to improved harvesting conditions and easier management of straw residue. There have been mixed and inconsistent results regarding seed weight. Studies have shown increased seed weight, decreased seed weight as well as no effect with TE use.



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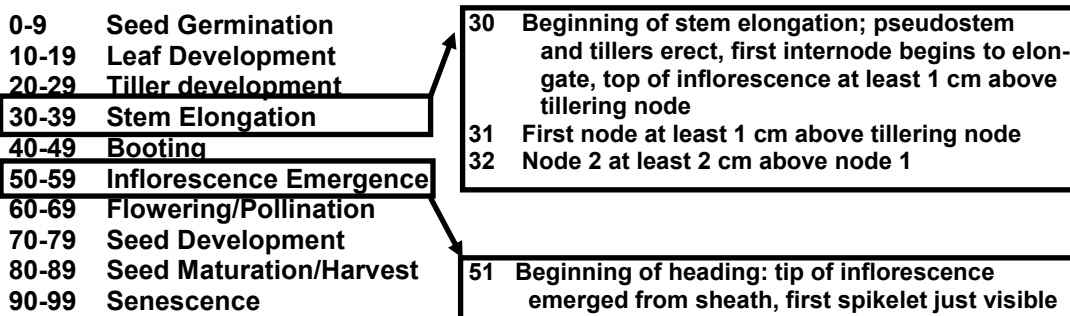
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When and how is a PGR used?

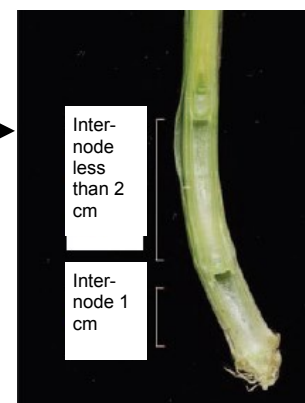
Application Timing and Rate: Depending on the plant growth regulator and the plant species, timing and application rates may vary. The general consensus according to most research done on TE and grass and legume seed crops is that TE is most effective when applied between early stem elongation (growth stage 30-32) and early inflorescence emergence (growth stage 51). Research shows that TE can be effective both in just a single application (at GS 30-32) as well as in a split application (at GS 30-32 and 51), but again, this depends on the plant species. Rates of application depend on the crop type and care should be taken not to exceed the recommended amount for the crop type in question. For example, according to the Parlay (trademark name for TE in Canada) label, the application rate on perennial ryegrass is 1.7-3.4 L/ha (mixed with at least 100 L of water per hectare) once per season.

Economy of Application: TE is applied as a foliar ground spray and while tank mixing with other relevant applications (e.g. mixing with pesticides) is common in parts of Europe, it is not widely done in Canada (likely due a lack of application timing overlap as well as its relative newness to our agricultural processes).



Above: An adaptation of the BBCH growth scale for grass seed crops (*Chastain 2015, Meier 2001*)

Right: Picture of GS 31 (*GRDC 2005*) (*See PFRSA website for full references*)



Allowable mixes are generally noted within the product's label or pamphlet.

Results: Results of TE use will vary with crop type, moisture and nutrient conditions, stand year and other factors. Current studies on seed crops are determining best practices with TE for optimal results. See research in Seed Head #10 and #11 for an example of results of TE use on red and alsike clover.

Risks: TE is not recommended for use on crops under environmental stress (e.g. due to drought conditions), and, in fact, has been found to be not as effective in certain crop types during dry years or in low nutrient conditions. There have been cases (see Seed Head #10 and #11) when yield has gone down with TE applications when red and alsike clover are under stressed conditions. Likely, the greatest risk to using TE on grass or legume seed crops will be due to adverse environmental conditions in which case no beneficial effects or even a slightly negative effect on yield may result (therefore the largest portion of the loss will be in the time and money spent on the application of TE), but there is little known risk with regards to crop damage or loss if TE is used correctly under appropriate environmental conditions.

Where are PGRs in Canada?

As mentioned previously, TE (Parlay™ by Syngenta Canada Inc.) and CCC (Manipulator™ by Engage Agro) are currently only registered for use in Canada on turf type perennial ryegrass and spring and winter wheat, respectively. The PRFSA is currently conducting trials using TE on grass & legume seed crops. Three years of data has been collected on red and alsike clover seed crops (summarized in Seed Head 10 & 11). Another three years of data is being

conducted on timothy, brome grass and creeping red fescue seed crops. The information from these grass seed crops will be compiled and available the winter of 2017-18. Residue trials will also be needed in order to determine the maximum residue allowances for TE treated products (and for animals which consume those products). Currently there are plans to register TE for use on cereal crops for 2019 which may make it easier to get a minor use registration for legume and grass seed crops in the future. This step will likely also make the product more affordable in the future.

Compiled & Circulated by: Shelley Kirk, Calvin Yoder & Talon Gauthier in March 2016.

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