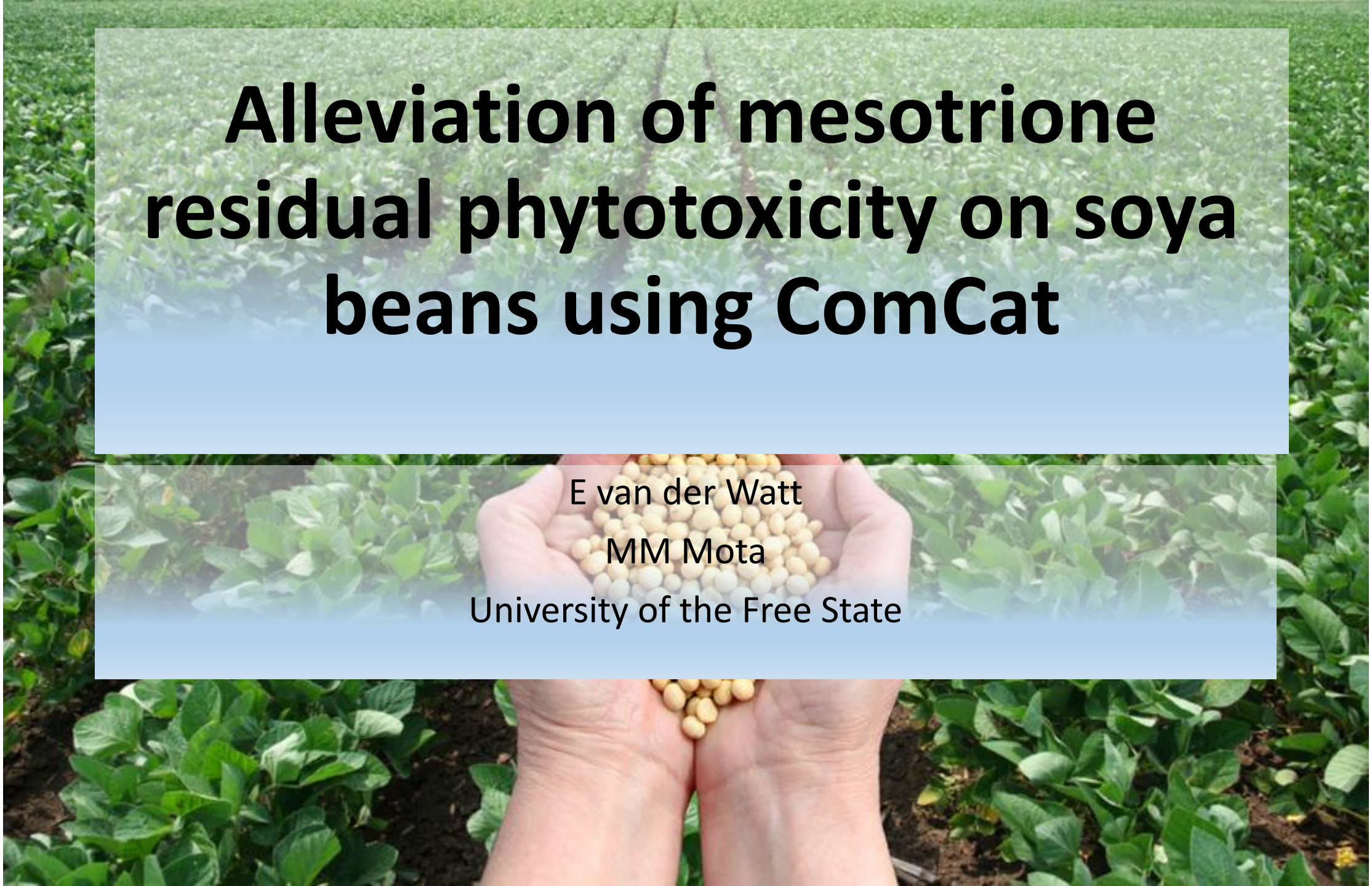
Alleviation of mesotrione residual phytotoxicity on soya beans using ComCat



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Motivation

- Agriculture is an important sector world wide because it eliminates poverty and sustain development.
- In order to get high production good management is required e.g weed control. Annual losses estimated at 10-80% without weed control.
- Use of herbicide is one of the most effective methods of controlling weeds but sometimes herbicide residues can be a problem in a crop rotation system.
- Use of ComCat can be used to alleviate any damage that might be caused by herbicide residual phytotoxicity.

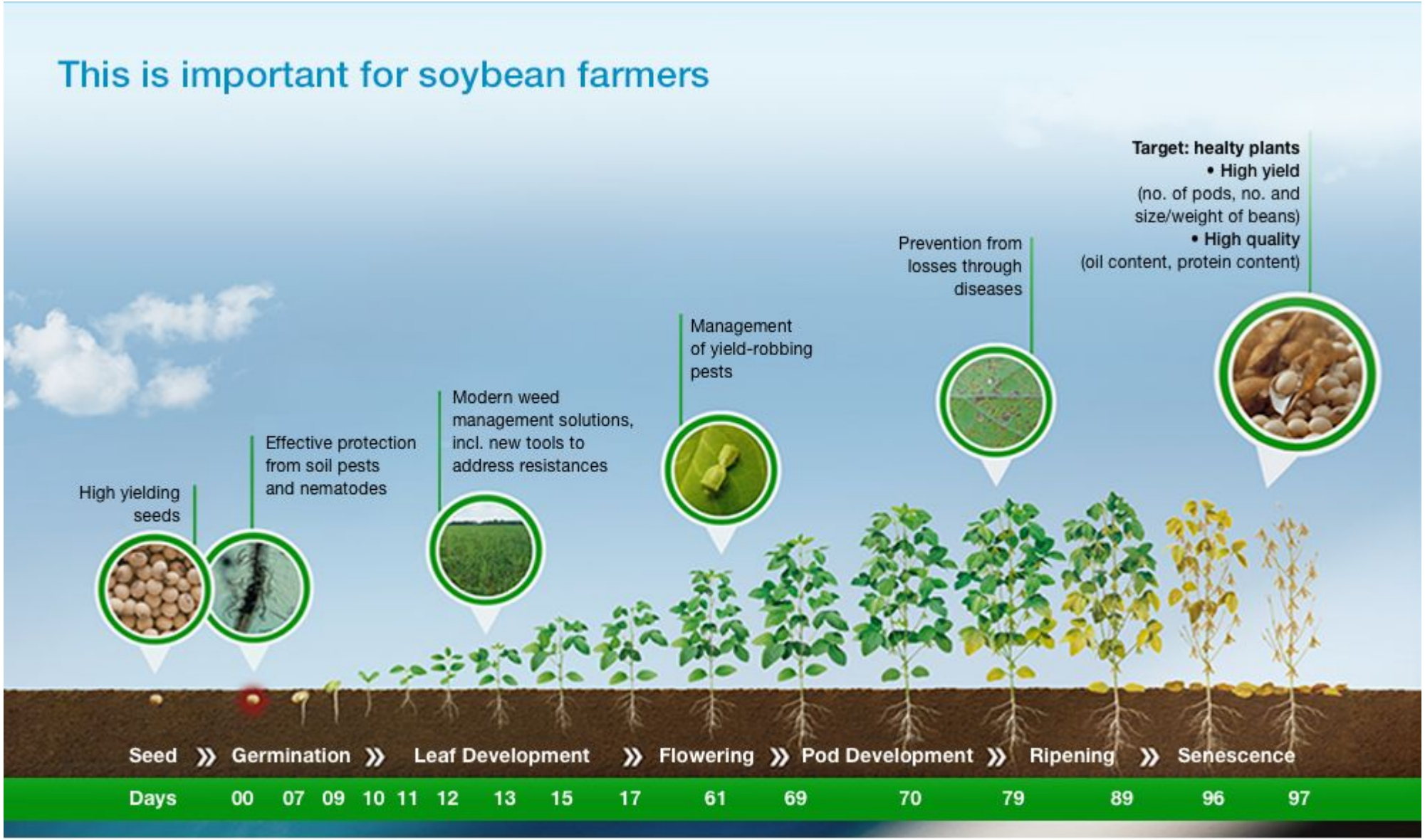
Mesotrione application

- Mesotrione was applied at four concentrations;
  - 0 µl/kg soil (0 DAA),
  - 1.6 µl/kg soil (45 DAA),
  - 0.05 µl/kg soil (90 DAA) and
  - 0.0016 µl/kg soil (135 DAA).
  - The rates simulates the concentration of mesotrione in the soil in the soil at 0, 45, 90 and 135 days after application (DAA) applying 124.8 g ai ha^{-1} of mesotrione.

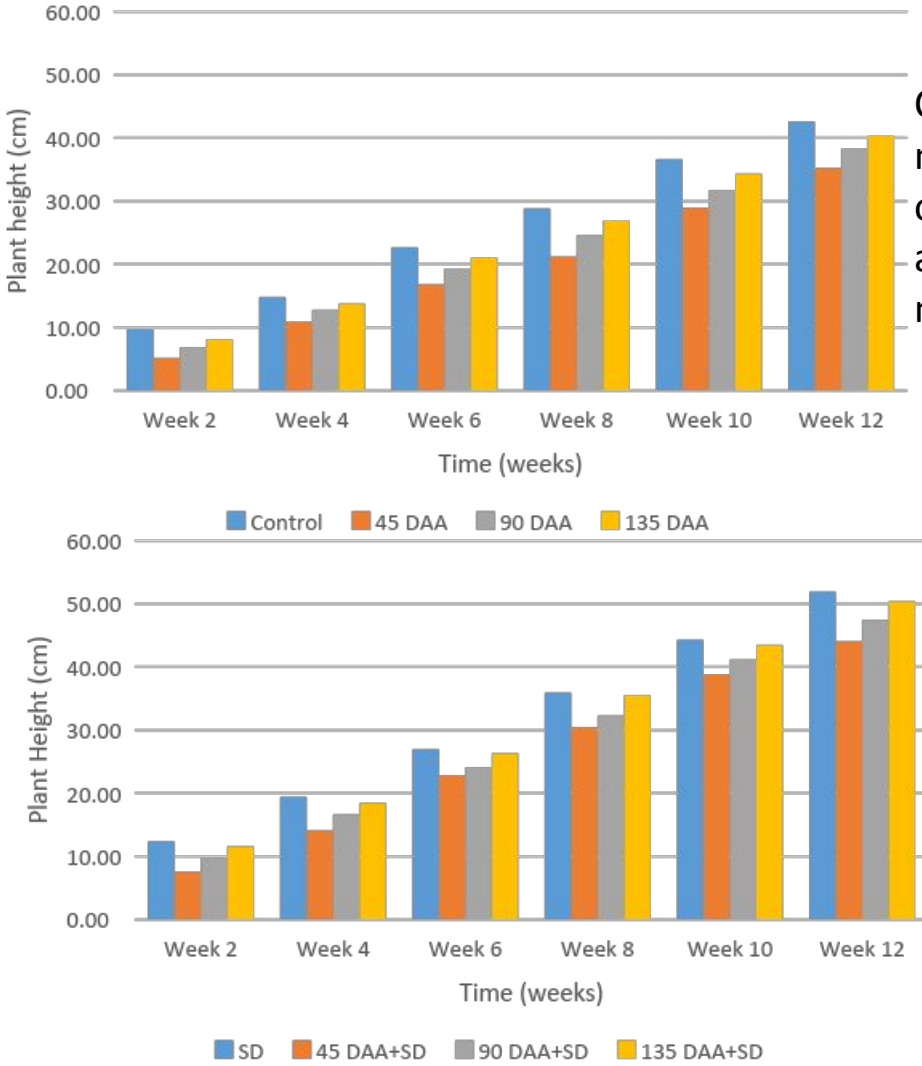
ComCat Application

- ComCat is applied at:
- As a **seed treatment (ST)** where seeds of soya bean seeds were treated with 100 g ComCat / ton (Preventative treatment),
- Secondly as a **foliar application (FA)** where 100 g ComCat / 300L/ha water sprayed on the leaves one week after emergence (Corrective treatment)
- And thirdly using it as a **soil drench(SD)** where ComCat at 400g /40 000L/ha water was applied at plant (Preventative treatment).

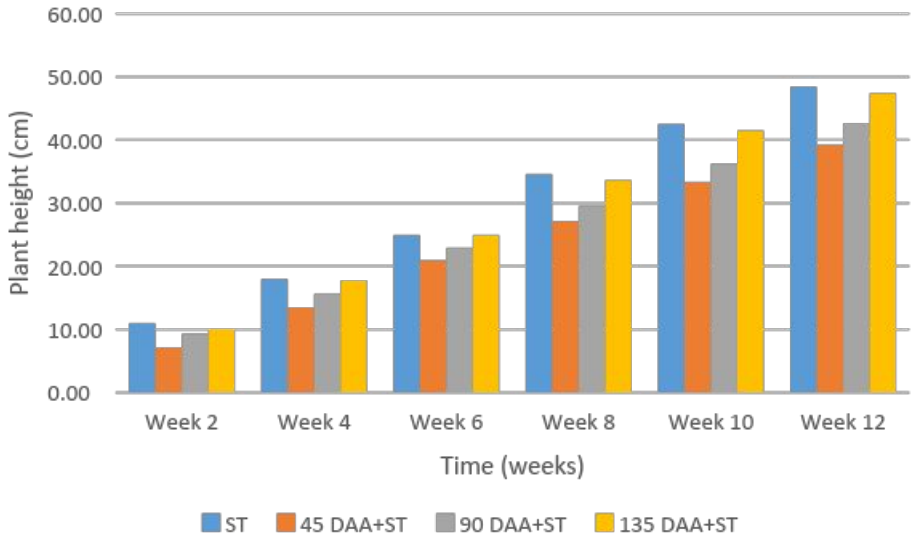
Morphological parameters



Mesotrione alone and in combination with ComCat treatments on plant height

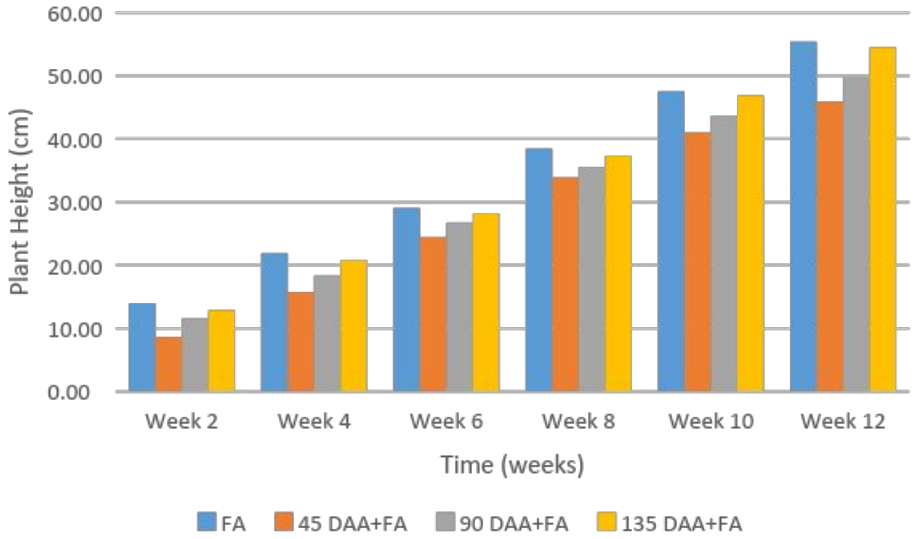


Control = no mesotrione or residual activity of mesotrione



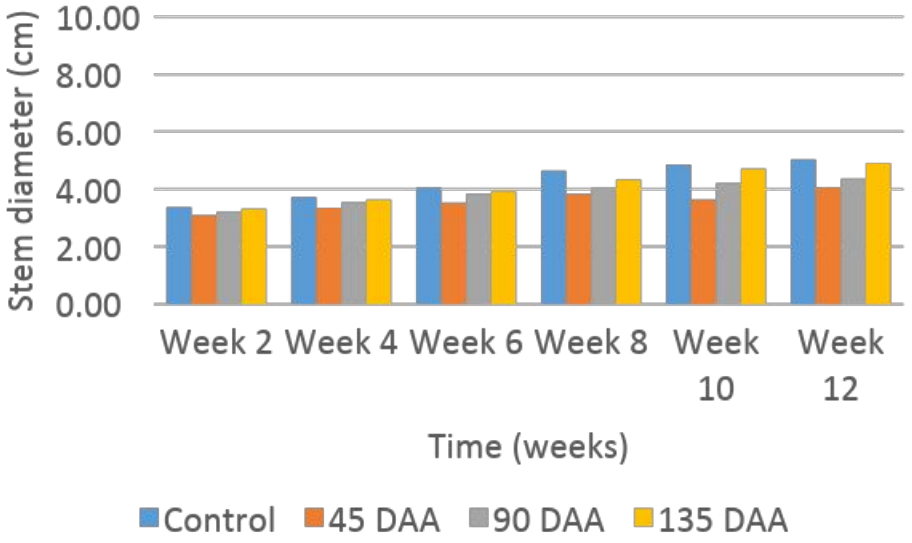
ST = Seed treatment alone or combined with mesotrione

SD = Soil drench alone or combined with mesotrione



FA = Foliar application alone or combined with mesotrione

Mesotrione alone and in combination with ComCat treatments on Stem diameter



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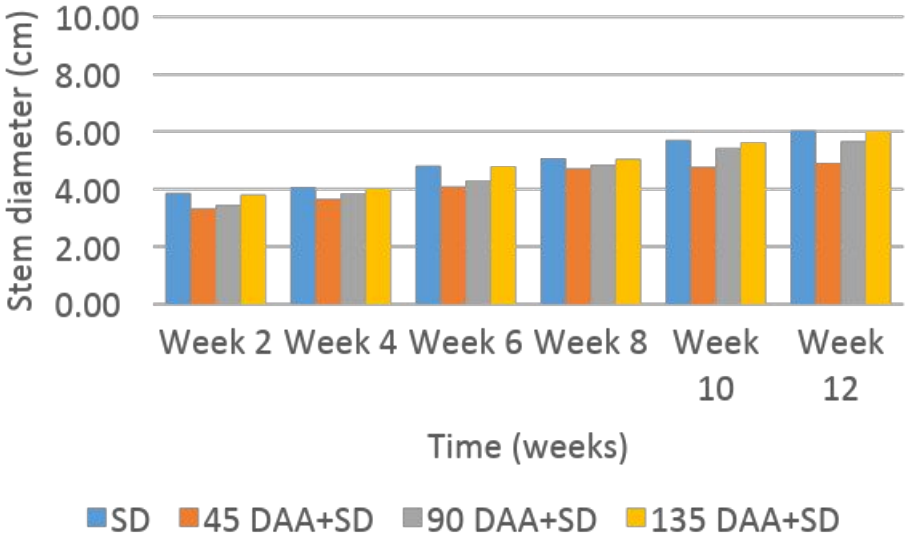

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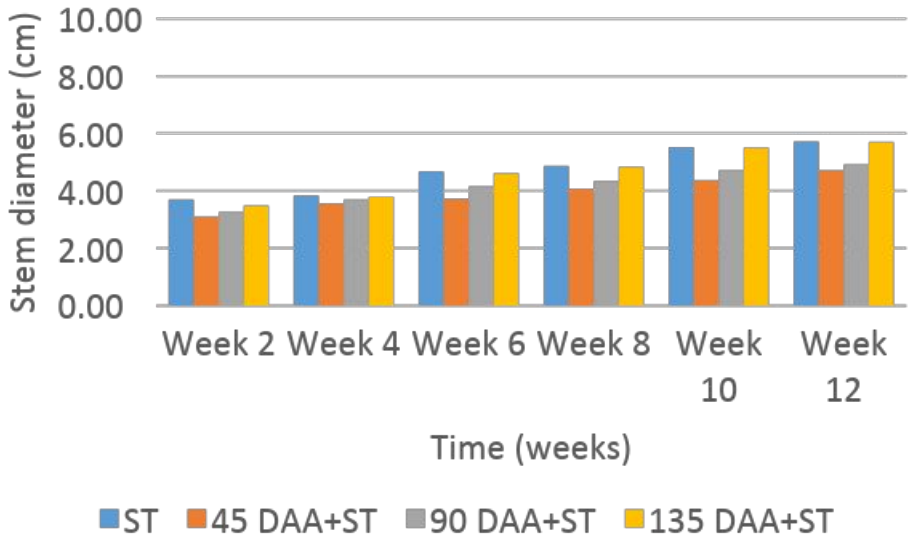

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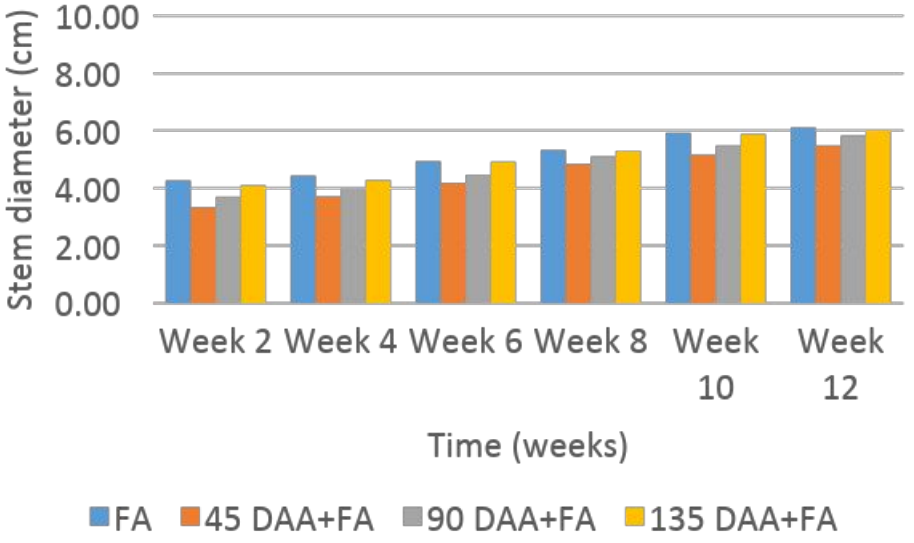

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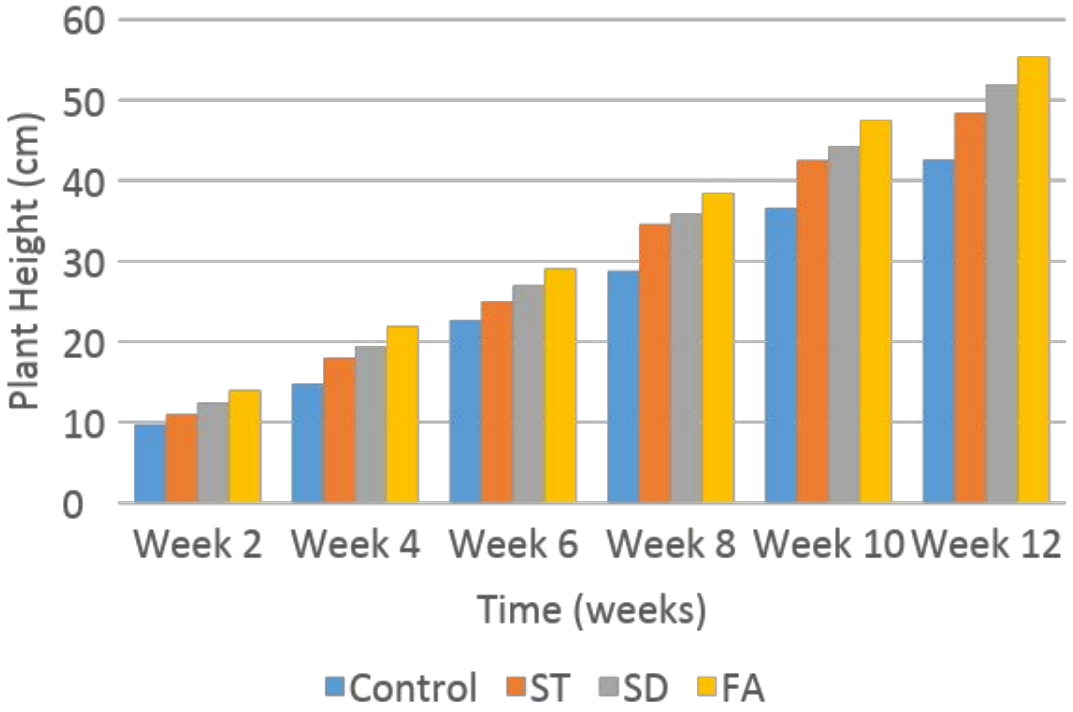
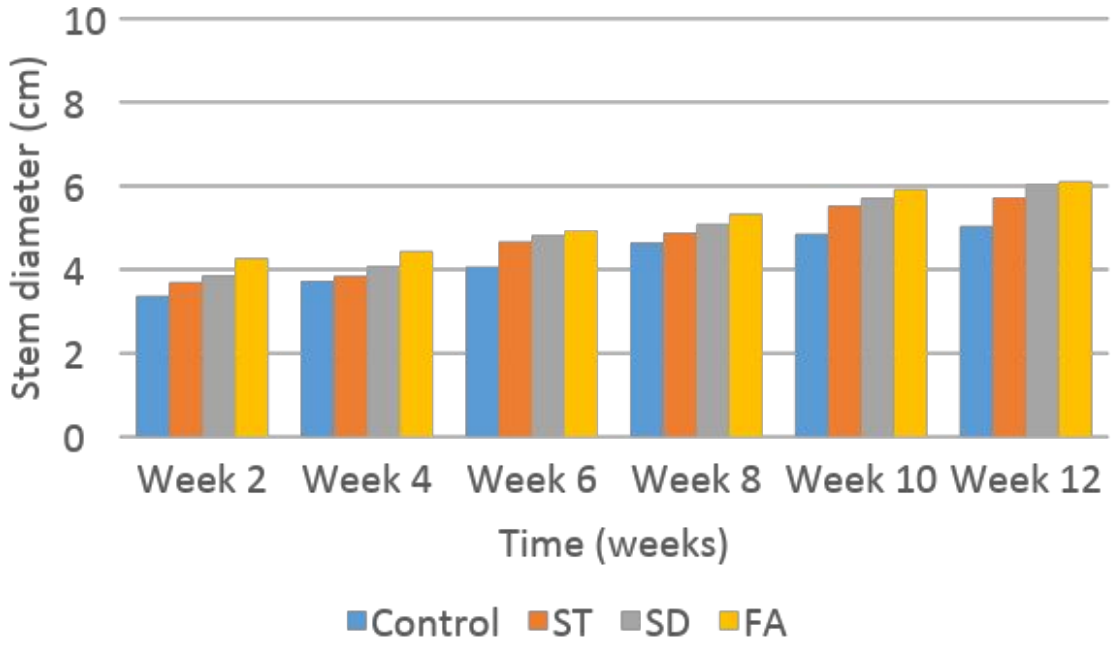
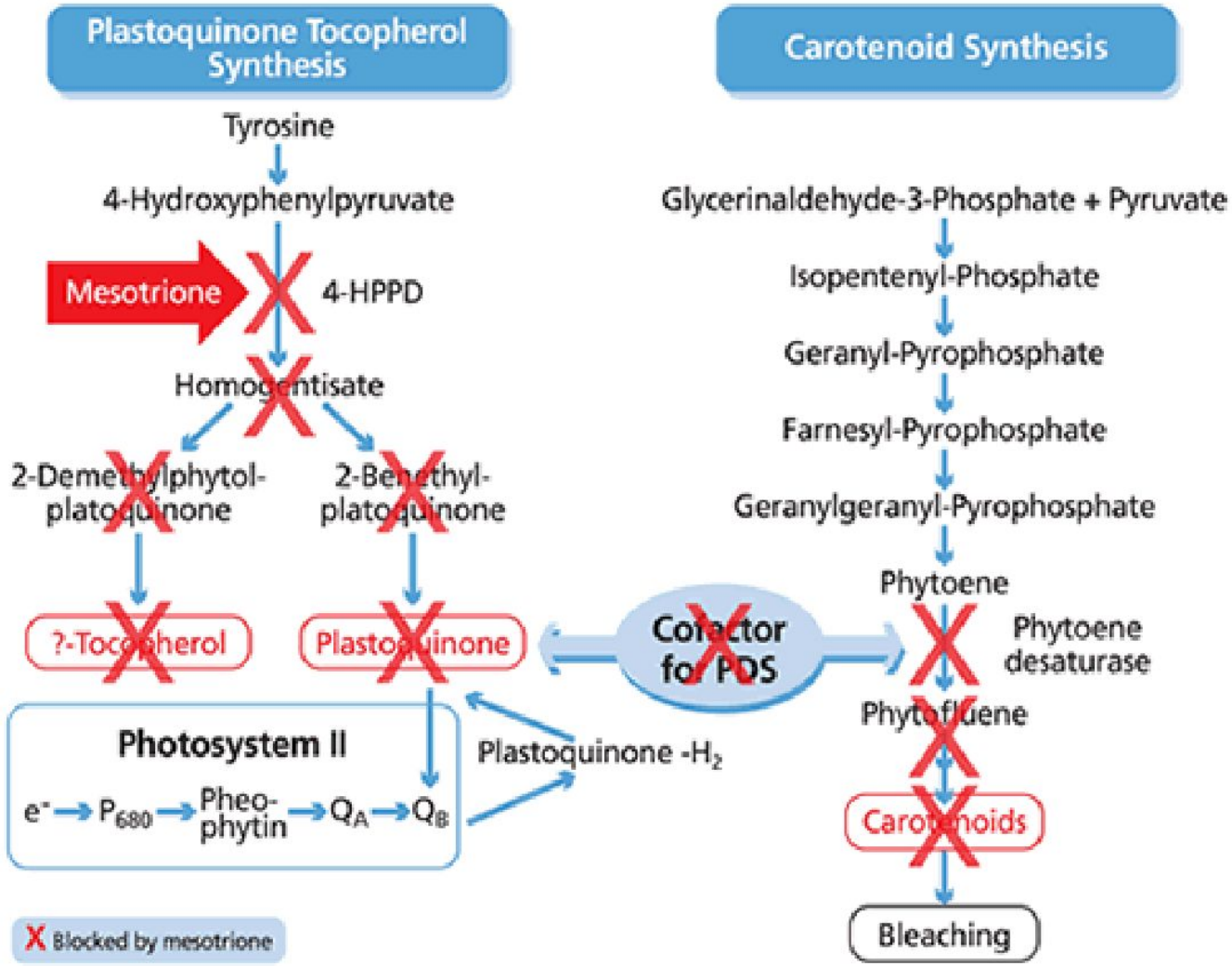
Different ComCat application on plant height and stem diameter of soybean





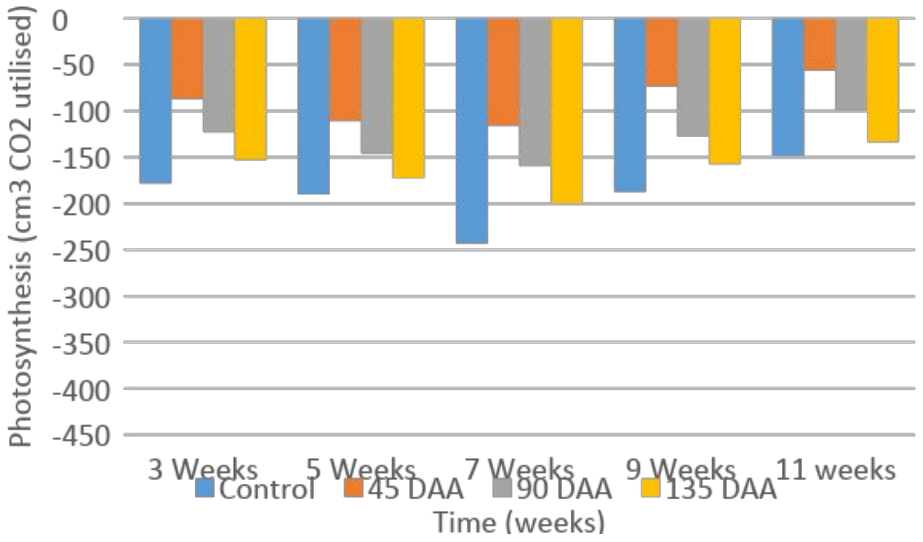
Control = fertilizer; ST = Seed treatment; SD = Soil drench; FA = foliar application

Physiological parameters



Mesotrione inhibition of the enzyme HPPD and carotenoid biosynthesis (Adapted from Syngenta, 2008).

Mesotrione alone and in combination with ComCat treatments on Photosynthesis



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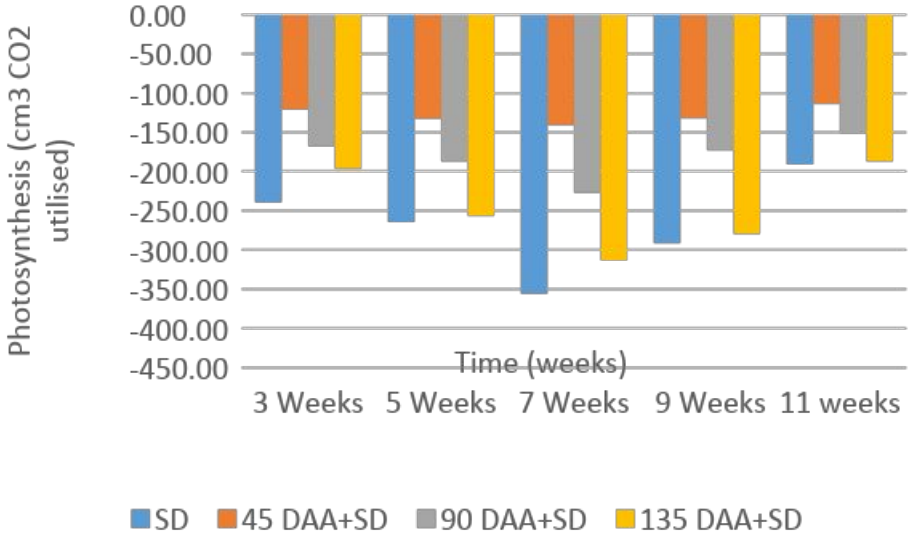

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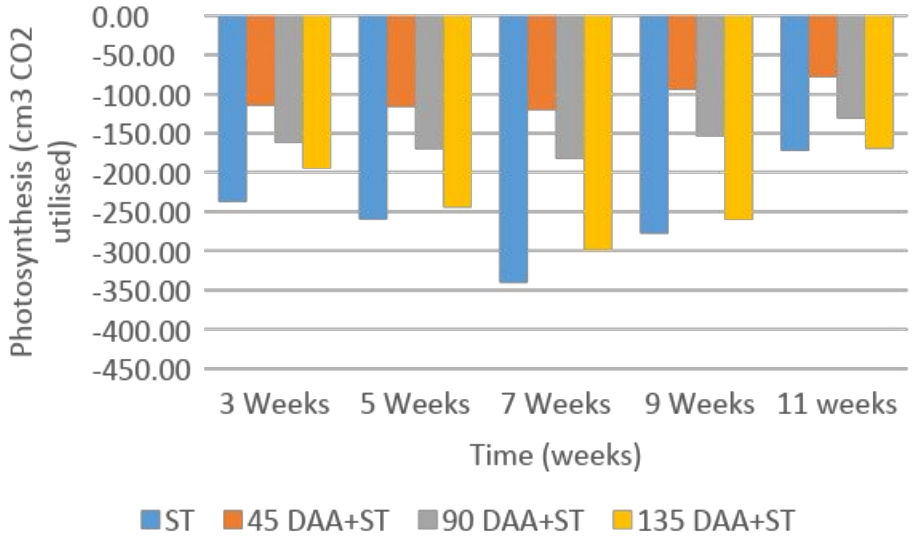

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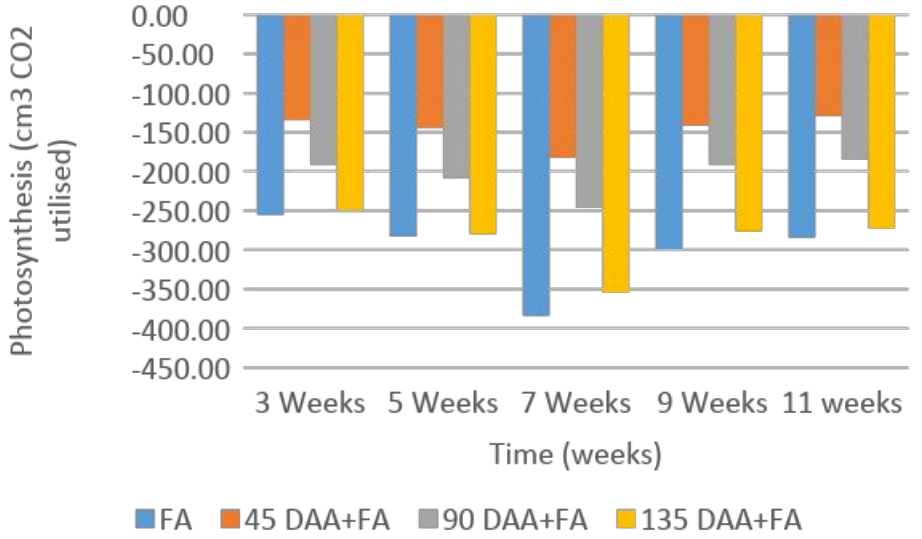

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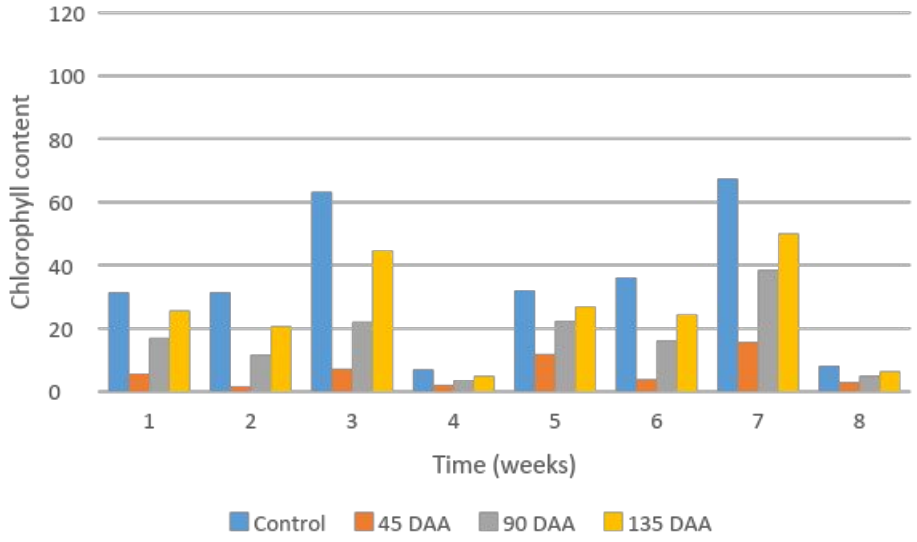
Mesotrione alone and in combination with ComCat treatments on chlorophyll content



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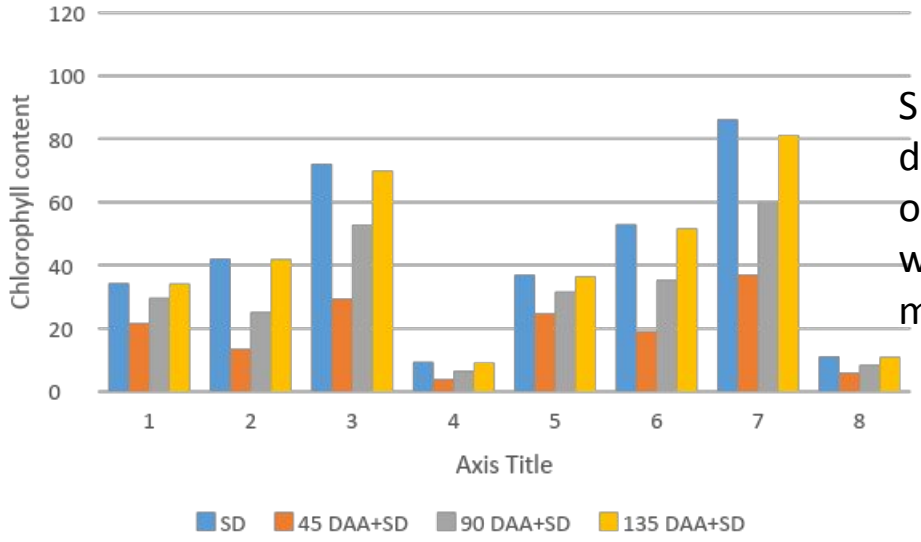

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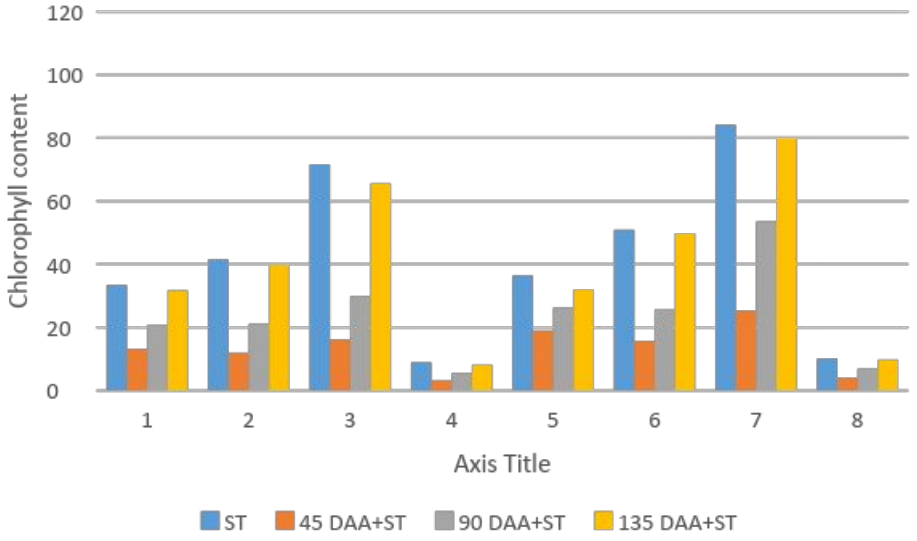

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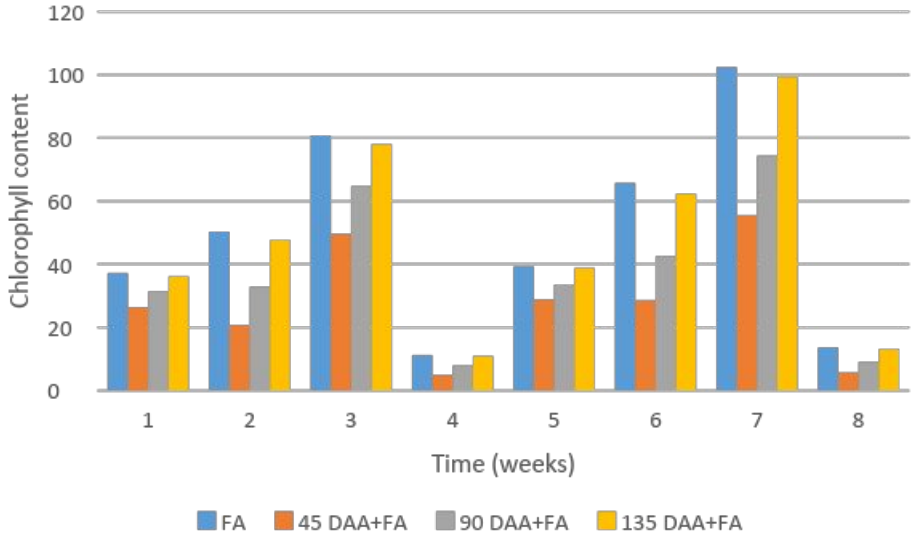

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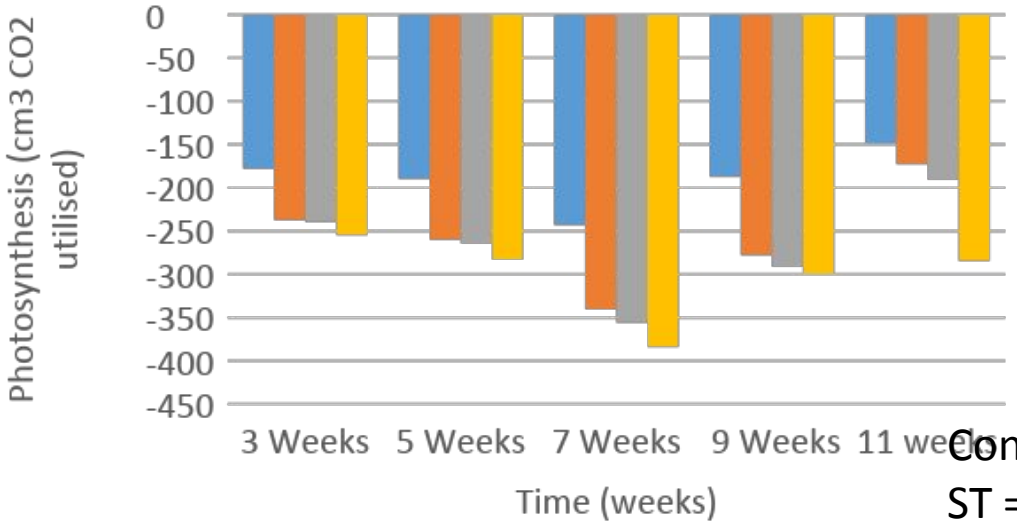
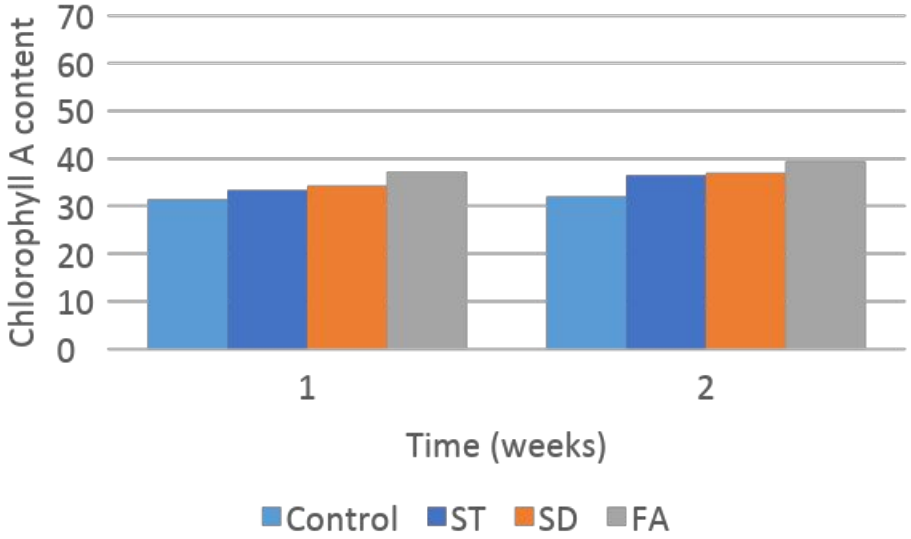
Effect of different ComCat application on photosynthesis, Carotenoid and chlorophyll contents of soybean





Control = fertilizer;
ST = Seed treatment;
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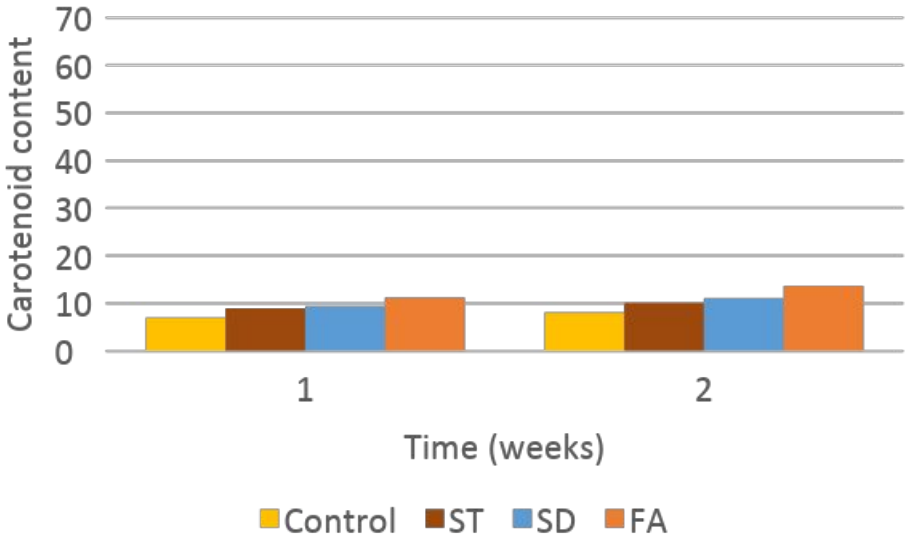
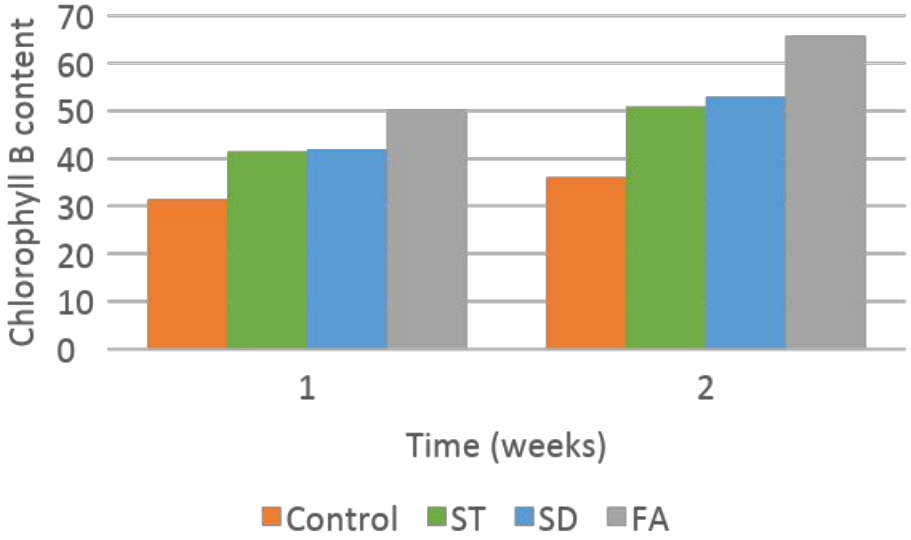
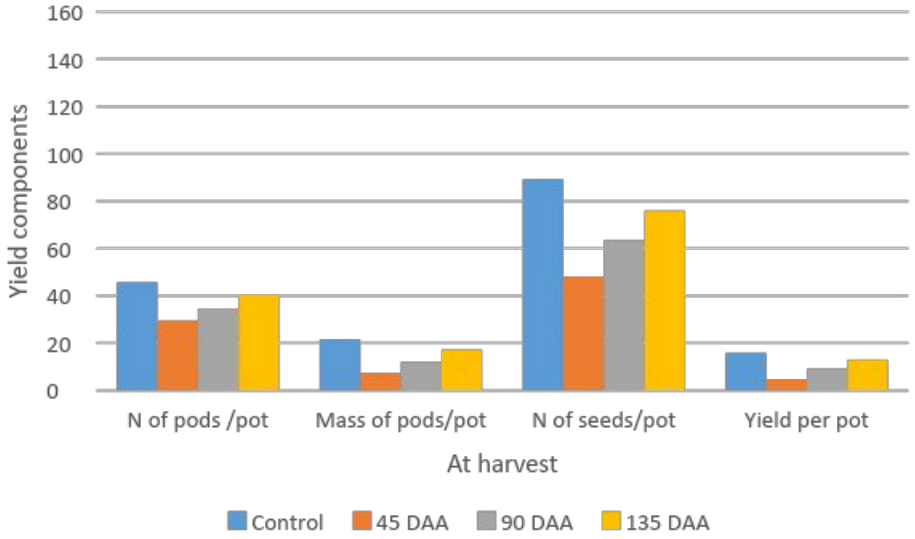




Yield data

Mesotrione alone and in combination with ComCat treatments on yield components



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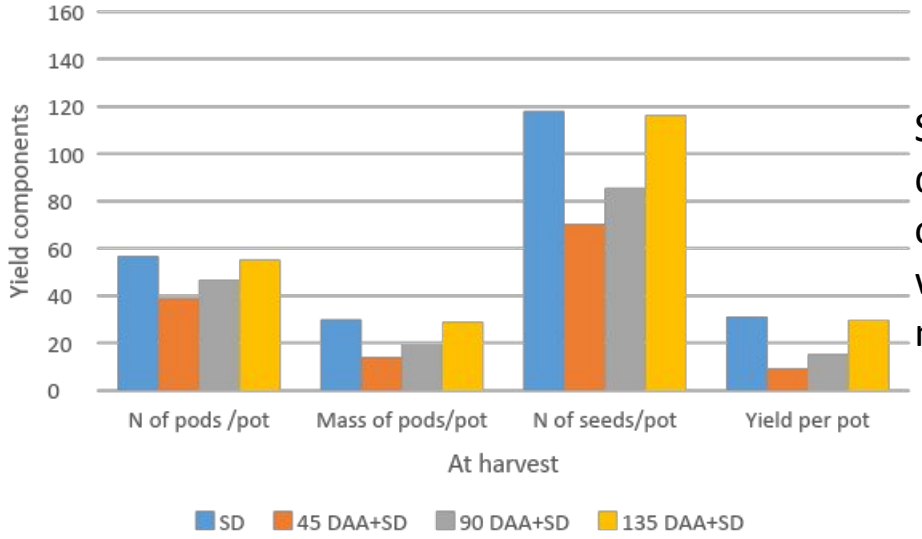

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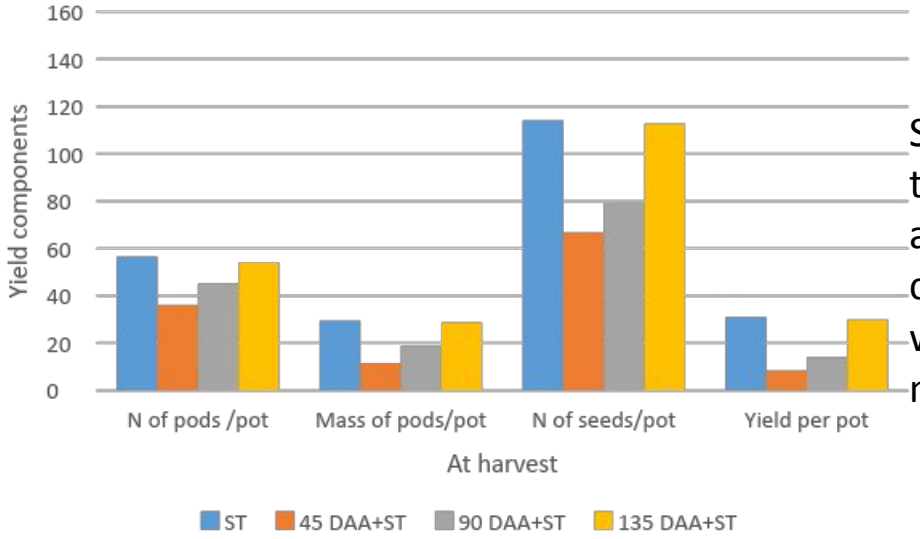

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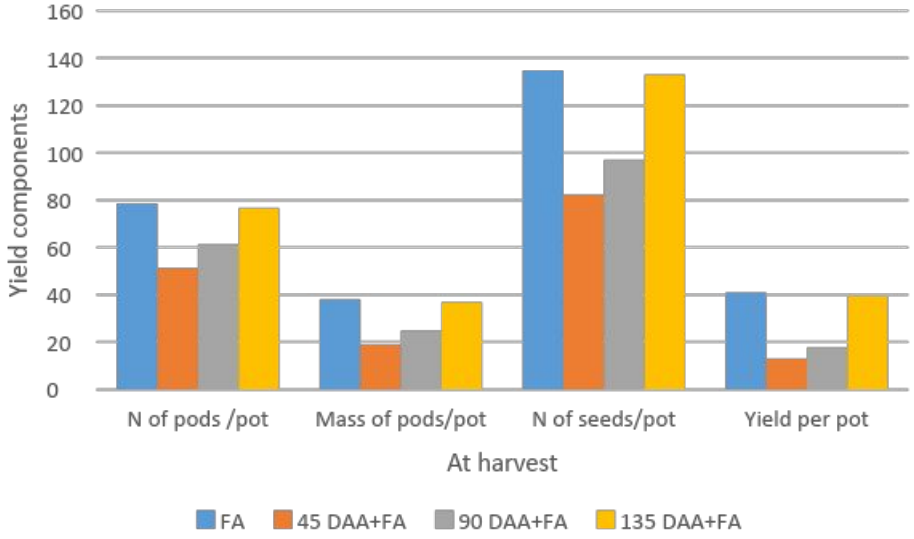

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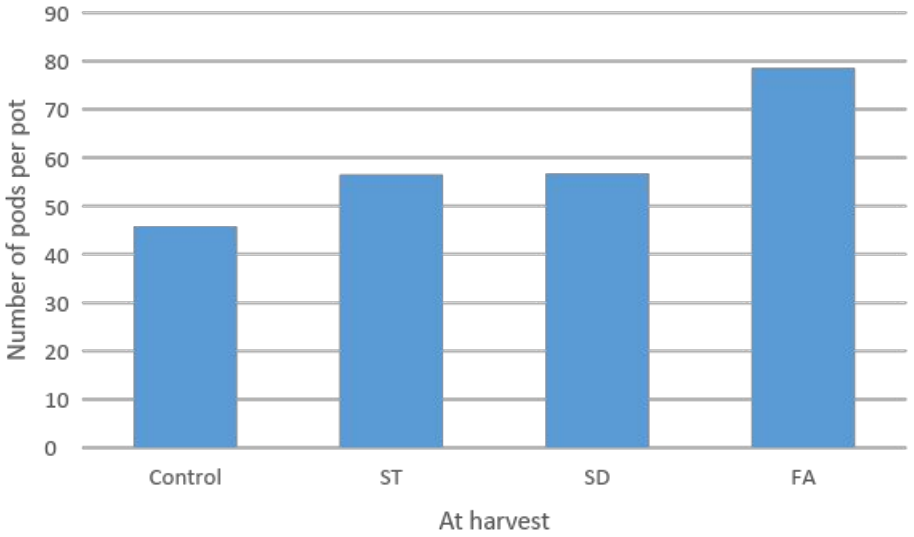
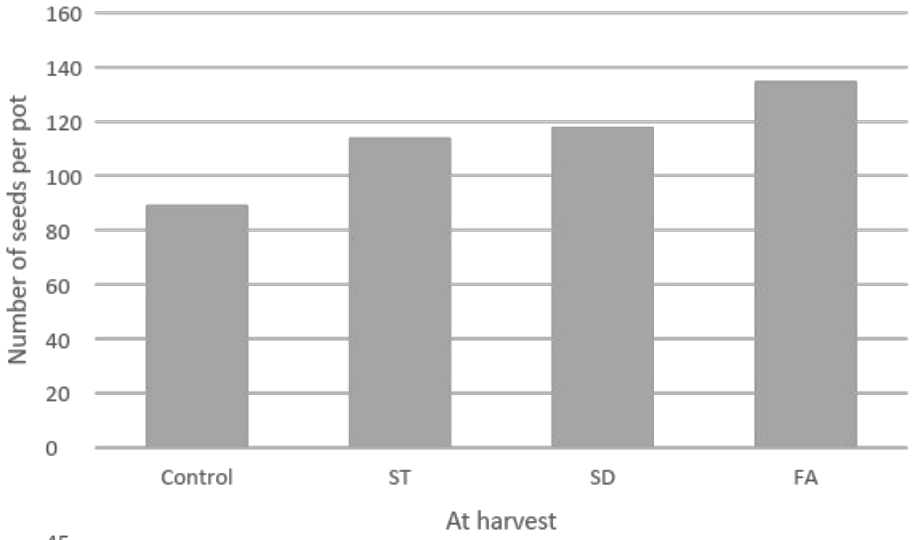
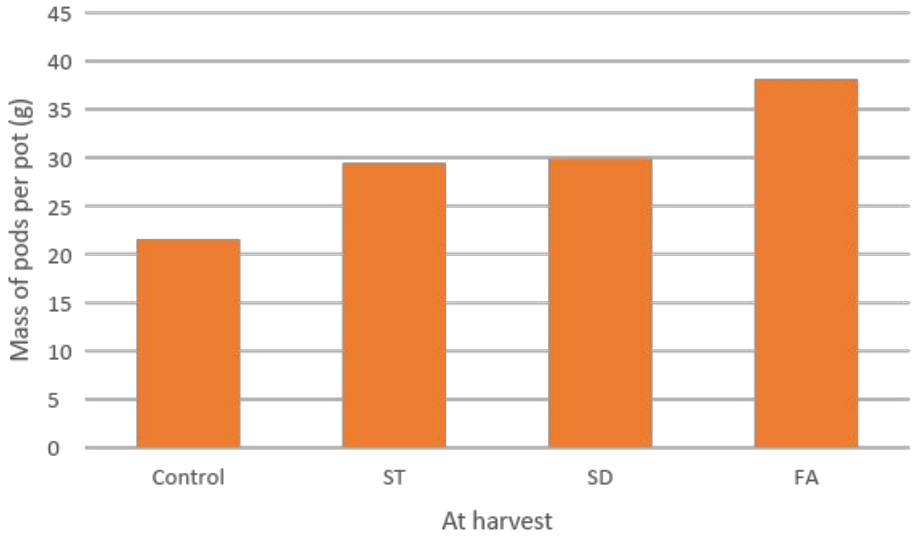
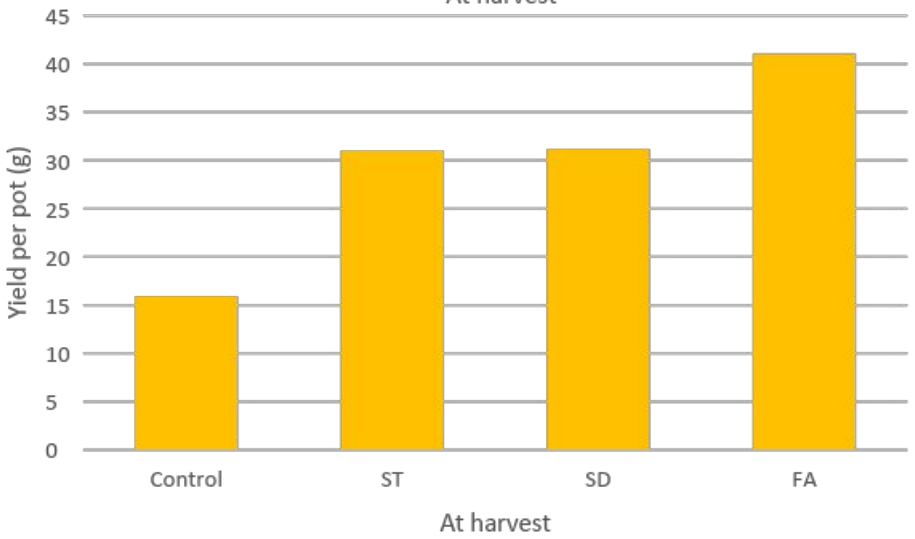
Effect of different ComCat application on yield components of soybean









Conclusion

- All the different application methods of ComCat had a positive effect on both the morphological and physiological parameters measured.
- All the application methods as a preventative and corrective method alleviated residual phytotoxicity of mesotrione
- Foliar application (corrective method) showed the best results after application to reduce the phytotoxic effect of mesotrione.

Conclusion

- May be in future both preventative and corrective methods can be combined depending on the damage observed due to herbicides.

- The same trial was also done on dry beans and groundnuts and the same tendency observed