

2005 RESEARCH SUMMARY WITH HERBICIDE-RESISTANT COMMON RAGWEED

Mark VanGessel
University of Delaware
Research and Education Center

In 2004, commercial soybean fields in Sussex County, Delaware were heavily infested with common ragweed plants that were not controlled by Firstrate plus Valor applied before planting and Reflex and additional Firstrate applied postemergence. Common ragweed would normally be controlled by these herbicides. The common ragweed collected from these fields was confirmed to be resistant to herbicides from two mode of action groups, the ALS-inhibiting herbicide group and the PPO-inhibiting herbicide group. In 2005, it appeared that less than five fields were infested with the resistant biotype.

I am summarizing our research that included a number of trials and studies that we conducted 1) in the greenhouse with the seed collected from the infested fields and 2) in the infested fields during the 2005 growing season. The research was conducted to determine the level of herbicide resistance and to evaluate other herbicide alternatives that could be used to control this herbicide resistant common ragweed.

GREENHOUSE RESEARCH

In greenhouse trials, herbicides were applied to plants grown from common ragweed seed collected from the infested fields (Resistant) and compared to plants grown from common ragweed seed collected from fields at the University of Delaware REC (UD-REC).

ALS-inhibiting and PPO-inhibiting herbicides that were applied to plants in the greenhouse included:

ALS-inhibiting herbicides*

Ally
Arsenal
Beacon
Classic
Firstrate
Permit/Sandea
Pursuit
Raptor
Sceptor

PPO-inhibiting herbicides*

Aim
Blazer
Cobra
Reflex
Resource
Valor

***These herbicides were applied at 0.1 to 500 times the normal use rate.**

Greenhouse Research Summary

- The resistant common ragweed was controlled less than 50% by ALL the ALS-inhibiting herbicides listed above when they were applied at 100 times the normal use rate.
- This common ragweed is HIGHLY resistant to the ALS-inhibiting herbicide mode of action group.
- In picture 1, you can see the differences in control between the resistant and the UD-REC common ragweed when the ALS-inhibiting herbicide, Firstrate, is applied at 1, 5, and 25 times the normal use rate (UTC represents the untreated plants).
- The resistant common ragweed required 10 to 30 times the normal use rate of the PPO-inhibiting herbicides listed above to achieve similar control of the UD-REC common ragweed.
- In pictures 2 and 3, you can see the response of the resistant common ragweed compared to the UD-REC (susceptible) common ragweed treated with Cobra, Valor, and Resource.
- At 10 to 30 times the normal use rate of the PPO-inhibiting herbicides, it is not uncommon to see some stunting and growth reduction of the resistant common ragweed, but the plants can recover enough to be quite competitive with the crop and to produce a large number of seeds.

FIELD RESEARCH

In field trials, a variety of herbicides were evaluated that we thought may provide control or suppression of common ragweed in soybeans. The herbicides tested were not from the ALS-inhibiting herbicide or PPO-inhibiting herbicide mode of action groups.

The herbicides tested included: Lorox, Sencor, and Command for soil-applied/ preemergence treatments and Basagran and glyphosate (Roundup) for postemergence treatments. We know that other soybean herbicides do not control common ragweed.

Field Research Summary

- Only glyphosate provided excellent common ragweed control in soybeans.
- Lorox, Sencor, and Command for soil-applied/ preemergence treatments and Basagran postemergence provided only poor control.

OPTIONS/ALTERNATIVES for controlling this herbicide resistant common ragweed

SOYBEANS

- The only viable option for control is to use a glyphosate product in Roundup Ready soybeans.

CORN

- Preemergence herbicides: atrazine and Princep are the only soil-applied herbicides that will control common ragweed.
- Postemergence herbicides: atrazine, 2,4-D, Banvel, Distinct, Marksman, (NorthStar and Yukon also contain Banvel and will control common ragweed) and Callisto tankmixed with 0.5 lb/A or 1 pt/A of atrazine. 2,4-D, Banvel, Distinct, Marksman, NorthStar and Yukon all need to be used with care since they are (or contain) volatile herbicides that can injure sensitive plants.
- Herbicide resistant corn is also an option, although rotating Roundup Ready soybeans with Roundup Ready corn is not a good strategy because of the heavy reliance on glyphosate for control. Liberty Link corn provides an option since Liberty is a different mode of action from glyphosate. Liberty was effective in controlling the herbicide resistant common ragweed in greenhouse trials.
- Clearfield corn is NOT an option because the resistant common ragweed was resistant to Pursuit and Arsenal (the components of Lightning).

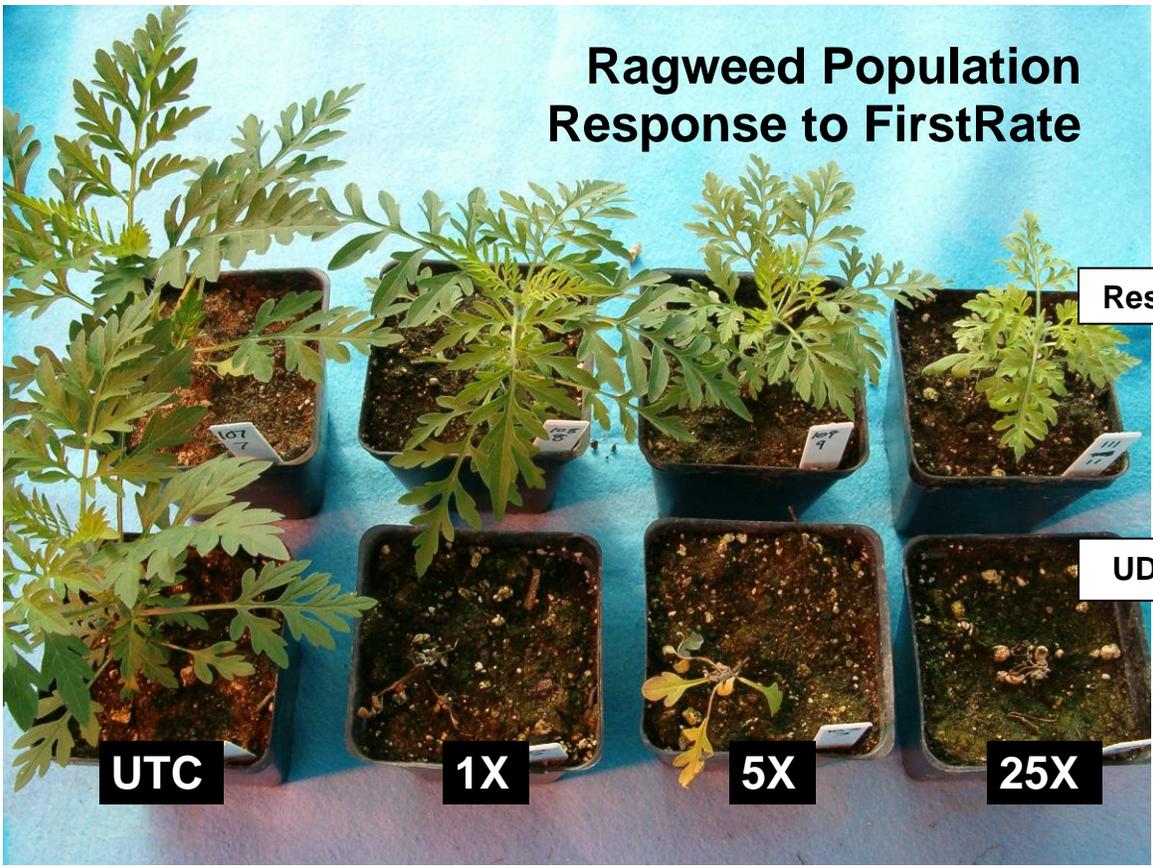
VEGETABLES

- Most vegetables rely on Pursuit, Raptor, Sandea, or Reflex for common ragweed control and this common ragweed is resistant to all of these options.
- Basagran is only effective on very small common ragweed plants (less than 2 inches tall).
- Due to the lack of effective herbicides options, vegetables should not be planted in the infested fields.

OTHER

- Many manufacturers are now using a numbering system to identify which the herbicide family which a product is grouped. Herbicides containing [ALS-inhibiting herbicides](#) are classified by the number [2](#). [PPO-inhibiting herbicides](#) are classified as number [14](#).
- The number system is to alert you to which herbicide mode of action (herbicide family) you are using and avoid using the same mode of action repeatedly.
- Resistance develops by selecting resistant-biotypes through repeated use of the same herbicide mode of action. Some questions regarding herbicide use need to be considered:
 - has the same herbicide (or herbicides) with the same mode of action been used consistently over a period of years?
 - has the species been controlled by the herbicide(s) in the recent past?
 - has there been a decline in control with the suspected species?
- One of the classic signs for resistance (for all situations where resistance is to a postemergence herbicide) is that only one weed species is present, all others are
- Due to the long-term dormancy of the common ragweed seed, this is a problem that will be around for a long time. A few years of excellent weed control is not sufficient to deplete this species from the soil seedbank.
- Common ragweed seed is relatively heavy and is not transported by wind.
- Movement by machinery is very likely, so be sure to clean equipment when leaving an infested field.

Ragweed Population Response to FirstRate



Resistant

UD-REC

UTC

1X

5X

25X



Resistant biotype and susceptible treated with Cobra, Valor, or Resource. The Susceptible biotype was treated with the normal use rate of the respective herbicide. Resistant biotype was treated with Cobra at 2X rate, Valor and Resource at 10 X rate.