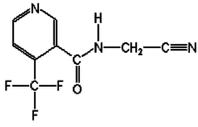


Transitioning Lygus Chemical Controls to More Selective Options for Arizona Cotton

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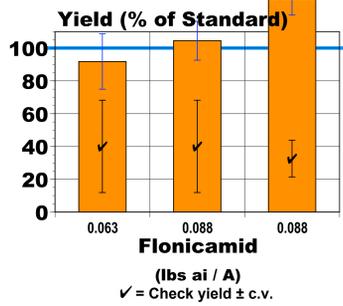
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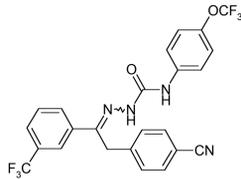
- FLONICAMID is a new class of chemistry, a pyridine-carboxamide. This compound is not persistent in the environment, has low residues and is environmentally safe. Toxicity to mammals, birds and fish is low.

- This potentially selective insecticide is very effective on *Lygus hesperus* & many aphid species.

- Translaminar activity in flonicamid as a foliar spray may be limited. However, translocation following foliar application may provide some protection of untreated plant tissues.

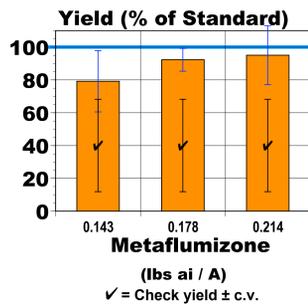


- Control of Lygus in cotton by flonicamid (0.088 lbs ai / A) is similar to acephate (1.0 lb ai / A), our standard for Lygus control. Although mode of action is unclear, tests indicate flonicamid has a unique fast-acting mode of action. Feeding is thought to be suppressed within an hour of contact or ingestion resulting in mortality of adults and immatures within 2-5 days.
- FMC Corporation has registered the trademarks: Beleaf® as a formulation for fruits and vegetables and Carbine® as a foliar insecticide on cotton.

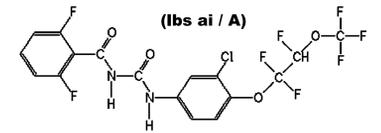
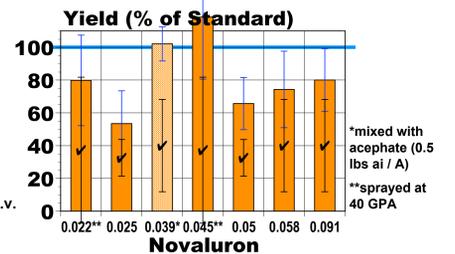


- METAFLUMIZONE, a newly developed semicarbazone by BASF, has a new mode of action and significant insecticidal activity.

- At the higher rates tested, metaflumizone shows efficacy on *Lygus hesperus* similar to that of acephate (1 lb ai / A), but with potentially less toxicity to beneficial insects.



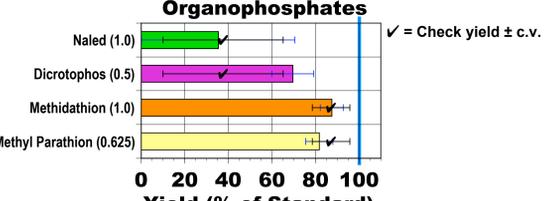
- In our trials, metaflumizone showed residual control of nymphs for about 10-14 days.
- Higher than expected nymphal counts are consistent with this compound having feeding inhibition properties.



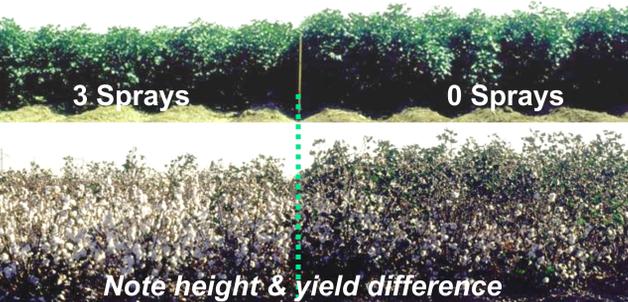
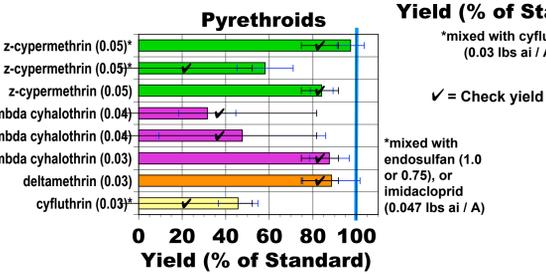
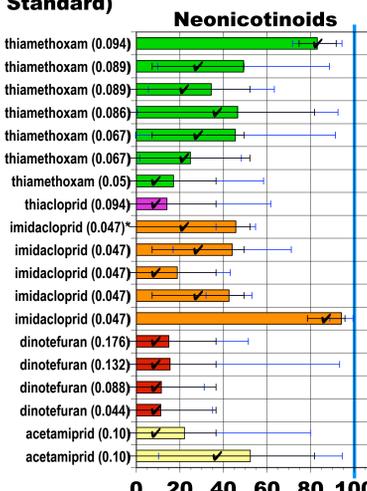
- NOVALURON, a benzoylurea, is under development by Crompton as Diamond® in the U.S.
- Novaluron is a rate sensitive insect growth regulator that inhibits chitin biosynthesis, active against immature stages only.
- It has broad-spectrum activity including Lepidopteran pests.
- The compound does not move in or on the plant and efficacy depends on direct contact or ingestion.
- High rates (0.091), high spray volumes (40 GPA) and/or mixtures with lower rates of acephate (0.5 lbs ai / A) have shown efficacy on *Lygus hesperus* comparable to acephate (1.0 lb ai / A). Residual activity approaches 14 days under field conditions.
- The high rates required to achieve control may be potentially destructive of hemipteran and other predators in our system.



Non - Effective



- Over many years of testing, pyrethroids, most neonicotinoids, and many organophosphates have failed to control *Lygus hesperus* in our cotton system.
- Control was not possible even when tested at higher rates, higher frequencies (than the standard, acephate), nor in mixtures.
- Even mixtures with proven performers failed to enhance control.

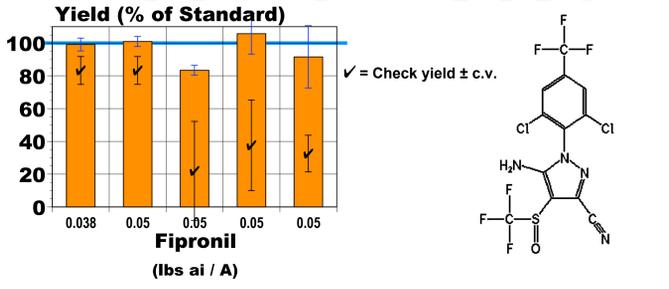


Summary

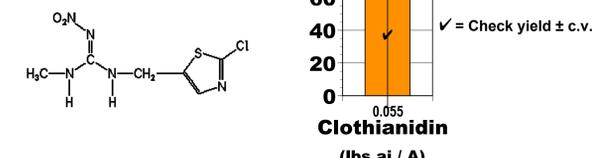
Control of *Lygus hesperus* in Arizona cotton has become an increasing challenge since the introduction of transgenic Bt cottons and Insect Growth Regulators, which have effectively and selectively controlled two of our key pests, *Bemisia tabaci* and *Pectinophora gossypiella*. Wide use of broad-spectrum insecticides on cotton has been replaced by more selective compounds. As a result, Lygus has risen to become our number one pest of cotton since 1997.

Few selective chemicals are available, but our data has identified three selective compounds that have efficacy on Lygus. Currently recommended, broad-spectrum organophosphates & carbamates could potentially be replaced by more selective & safer compounds. Novaluron, an IGR, has Lygus activity, but high rates may be less selective. Metaflumizone & flonicamid, both with anti-feedant properties, show great promise.

Not Marketed



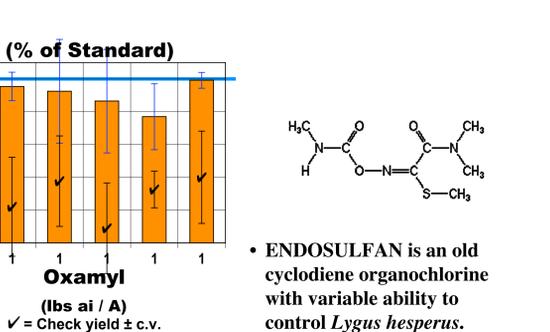
- FIPRONIL, a phenylpyrazole, has a novel mode of action, with both contact and ingestion activity on a broad spectrum of pests.
- It has shown good efficacy on *Lygus hesperus* in our tests, comparable to our standard.
- This compound is not being developed for foliar use in cotton.



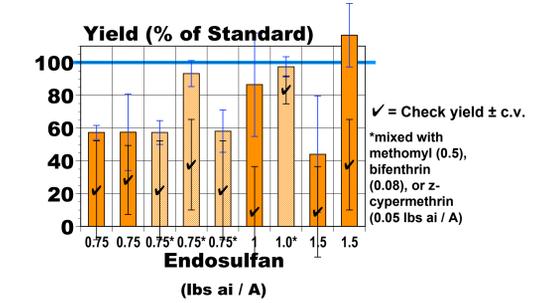
- CLOTHIANIDIN is the only neonicotinoid tested that shows significant efficacy on *Lygus hesperus* in cotton.
- It is not marketed (foliar) in cotton.

Non - Selective

ACEPHATE, our standard, is a broad-spectrum organophosphate with excellent and dependable activity on *Lygus hesperus*.



- OXAMYL is a carbamate that has proven to be very effective against *Lygus hesperus* over many years of trials, comparable to acephate.
- As a broad-spectrum insecticide, oxamyl can be damaging to natural enemy populations.



References

Barkley, V. & P.C. Ellsworth. 2004. Search for effective chemical controls for *Lygus* bugs and whiteflies in Arizona cotton. In R. Tronstad [ed.], Cotton, A College of Agriculture Report. Series P-138. University of Arizona, College of Agriculture, Tucson, AZ. pp. 187-197.

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Arizona Cotton Information Site (ACIS). URL: <http://caals.arizona.edu/crops>