

Sandea – A New Herbicide for Vegetable Crops

A Technical Review

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Sandea is the trade name for a new soil residual selective sulfonylurea herbicide which will be registered for selective weed control in certain vegetable crops such as asparagus, cucumbers, cantaloupes, tomatoes, winter squash, and possibly beans, and watermelons.

Sulfonylurea herbicides were first patented in 1977 by the Du Pont Co. By the mid 1980's 14 agrichemical companies had S U patents and there were 230 patents in the U.S. alone. These new low use rate soil residual and foliar absorbed herbicides did have Pre and Post activity with medium to long soil persistence.

These herbicides are classified by their mode of action and they are all inhibitors of the (ALS) aceto lactate synthase enzyme system inside plants. There are four families of herbicides which have this same mode of action: sulfonylureas, imidazolinones, pyrimidinylthiobenzoates, and thiazolopyrimidines. That is to say that each herbicide which inhibits the (ALS) system works to control weeds in the same way but may have very different levels of activity on specific weeds or crop plants. Examples of these herbicides in the four families are:

Sulfonylureas; chlorsulfuron (Glean, Telar), chlorimuron (Classic), bensulfuron (Londax), rimsulfuron (Shadeout, Matrix), ethametsulfuron, (Muster), metsulfuron, (Escort, Ally), sulfometuron (Oust), triflusaluron, (UpBeet), triasulfuron, (Amber), thifensulfuron, (Pinnacle), nicosulfuron, (Accent, Muster, Steadfast), halosulfuron, (Permit, Manage, Sempra CA, Sandea), prosulfuron, (Peak), primisulfuron, (Beacon), and thiameturon, (Hamony)

Imidazolinones; imazamethabenz, (Assert), imazapyr, (Arsenal), imazaquin, (Scepter), imazethapyr, (Pursuit),

Pyrimidinylthiobenzoates; pyriithiobac sodium, (Staple),

Thiazolopyrimidines; clopyralid, (Broadstrike, Stinger).

Plant selectivity is primarily due to rapid degradation within certain crops which can tolerate these chemicals and little ability to degrade the herbicides in weeds which are controlled.

Plants have an (ALS) aceto lactate synthase enzyme system which helps the plant manufacture three key amino acids: valine, leucine, and isoleucine which are needed by the plant to build proteins to support development of cells and general plant growth.

When this enzyme system is inhibited or shut down by the presence of halosulfuron inside the plant, the plant is retarded or stopped in its ability to continue manufacturing the needed amino acids. And, when there is an interruption in the necessary amino acids plant cell development slows down or stops where the concentration remains high enough in the plant tissue. Thus, the

first symptoms normally seen following an application of halosulfuron or other ALS inhibiting herbicides is stunting of new plant growth at the meristematic cell areas of plants in the developing root tips or new shoot growth. Then other symptoms such as mild chlorosis will follow for a period of 7-14 days.

For plants which do not have the ability to metabolize halosulfuron you can expect extended plant stunting or death of younger more susceptible plants. For crop plants in the grass family like corn and sorghum and cereals there is normally little effect from halosulfuron as these plants have a strong system of (MFO) mixed function oxidases which breakdown the herbicide molecule to acid metabolite forms which are 1/30th to 1/50th as toxic to plants and these crops and weeds return to normal growth in a very short time after an application of halosulfuron.

Vegetable crops have moderate to low levels of (MFO) present inside the plant to help breakdown the herbicidal action of halosulfuron and there lies the challenge of finding just the right rate of exposure which each crop can tolerate and metabolize effectively and return to normal growth. Common experience is to see a vegetable crop show some degree of stunting for 7-14 days after an application of halosulfuron and then return to normal growth once the herbicide has been degraded sufficiently. Under most conditions the vegetable crops on which Sandea will be registered for use will return to normal growth in 14-21 days after an application.

Halosulfuron is absorbed by roots, shoots and especially new foliage of weeds and crop plants. The herbicide is absorbed in approximately 4 hours under good growing conditions so that the effects will not be washed off by rain or irrigation. Then the active ingredient is translocated first into the xylem and then through the phloem where it can accumulate in the apical buds at the tips of roots, in shoots, and leaf axils and reproductive structures including below ground nutlets of nutsedge plants.

Even though halosulfuron inhibits plant growth, seed germination is generally not affected. However, growth inhibition of new cells is very rapid and secondary symptoms of yellowing and sometimes reddening can be seen in 7 - 10 days after an application.

For crops which have a very active (MFO) system to breakdown the herbicide there will very few symptoms of crop injury for a short period of time. Then the crop will return to normal active growth. There are many things that a grower can do to help crops tolerate an application of halosulfuron and return to normal growth. The best way to overcome the herbicidal activity is to manage the crop in the best way to help it grow. Give the crop water, air to the roots, fertilizer or other treatments to encourage return to good vigor.

The half-life of halosulfuron is stated to be 9-14 days in the soil but that depends upon the pH of the soil, soil type, temperature, soil moisture, and general health of the soil. Microbial degradation is one of the most effective means of degrading the herbicide in soils followed by chemical hydrolysis. The herbicide will remain active longer in cold wet soils than hot wet soils. The herbicide will hydrolyze more rapidly in soils where the pH is < 4.5 or > 7.5.

Some vegetable crops are very sensitive to small amounts of halosulfuron in the soil so plantback studies have been conducted to indicate safe recroping time intervals.

There are a number of field crops which can be planted back with safety after only a few months and these crops should be considered prior to use of halosulfuron.

Safe time intervals in months after an application of halosulfuron to a soil for specific crops have been determined which will allow for germination and good crop growth. These time

intervals are listed on the product label and should be referred to prior to use of any S U herbicide and then followed after use.

One other point needs to be made relative to use of Sandea and that is proper spray equipment clean-out procedure. There are specific directions on the label for proper clean-out of spray equipment which should be followed in order to prevent unintended crop injury in subsequent uses of that equipment.

With all the above information, Sandea can be used effectively and safely for selective broadleaf and nutsedge control when the proper rates, timing and method of application, PPPE, POST, POST-DIR or with Crop Row Shields or Row Middle sprays, to provide excellent weed control and good crop safety. The product will not fit for use in all vegetable crops but can be used safely on certain crops as listed above.