



Phenoxy Herbicide Drift Injury on Tomato Plants

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Herbicide History

In 1940, the first selective herbicide was developed to kill specific broadleaf weeds without harming the crop

Dicamba was synthesized in 1942,
but not released until 1965

Registered for use on asparagus, barley, corn, cotton, sorghum, soybean, wheat, hay, pastureland, lawns, for conservation reserve programs, fallow croplands, etc.

Old formulations of dicamba are volatile after application and are prone to off-site movement



Trade Names for Dicamba Products

Banvel - old formulation

XtendiMax - Bayer

Engenia - BASF

Tavium – Syngenta

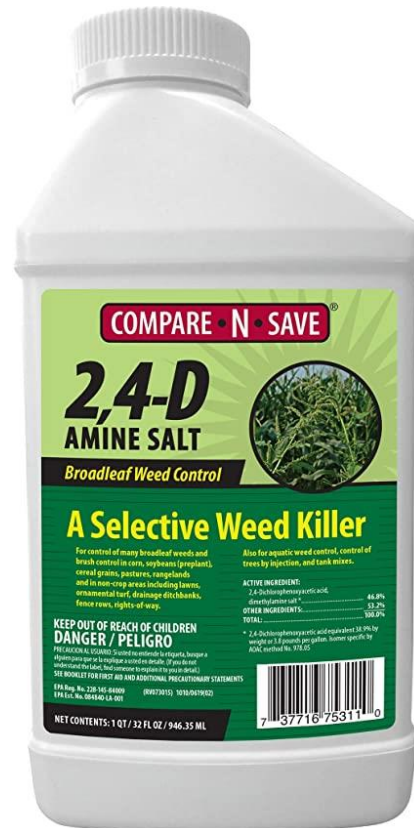


XTENDIMAX[®]
With **VaporGrip[®]**
Technology

Trade Names for 2,4-D Products

Enlist One – Corteva AgriScience

Enlist Duo



 **Enlist One[®]**

COLEX·D[®] technology

HERBICIDE

Five-Way Herbicide-Tolerant Corn

MON 87429

Bayer has petitioned USDA APHIS to deregulate their herbicide-tolerant corn (2,4-D, dicamba, glyphosate, glufosinate, and quizalofop

Assure II[®] or Targa[®]
postemergence herbicide
used to control grass weeds
in Enlist[™] corn, soybeans,
cotton, snap beans, dry beans,
peas, sugarbeets, non-crop areas, etc.



May increase the acres treated with dicamba and 2,4-D

Auxin Herbicide Symptoms

- Symptoms begin to develop 24 hrs
- Bending or twisting of stems or petioles
- Split stems with protruding root tips
- Deformed leaflets with a sharply pointed leaflet tip
- Flower and fruit loss
- Malformed fruit with delayed maturity



Hormesis Caused by 2,4-D

Vegetative growth is
increased or enhanced
at a low dosage



Dicamba Symptoms

Injury to the growing point
on the main tomato stem

Stunting of leaves

Causes stunted plants with
bushy growth from side shoots



Stages of Greatest Sensitivity

Flower bud stage



Bloom stage



Cultivar Study

Do any of the commonly-grown commercial tomato varieties have tolerance to 2,4-D or dicamba drift?

Plants about 9" tall with no visible flower buds were treated with dicamba or 2,4-D drift at 1/200th the labeled rate for herbicide- tolerant soybean on June 15

Treated plants were isolated for 3 days by treatment to prevent cross contamination and then field-planted

Used white plastic mulch, stake & weave support system; drip-irrigated; alternated $\text{Ca}(\text{NO}_3)_2$ with Masterblend fertilizer weekly



Early Misshapen Fruit

Primo Red

Nontreated



Dicamba



Red Morning

Nontreated



Dicamba



Skyway

Nontreated



2,4-D



Dicamba



Celebrity

2,4-D



Nontreated



Total Yield (lbs/plant)

Cultivar	Control	Dicamba	2,4-D
Florida-91	21.7	20.7	18.4
Celebrity	19.4	18.0	18.0
Skyway	19.4	14.3	17.7
Primo Red	19.3	14.1	17.1
Red Deuce	19.2	16.4	17.8
Red Morning	18.9	16.2	16.6
BHN 589	17.5	16.1	15.7
Mountain Merit	13.4	14.8	13.4

Yield of all tomato varieties was reduced by either herbicide, except for Mountain Merit

Marketable Yield (lbs/plant)

Cultivar	Control	Dicamba	2,4-D
Florida-91	18.1 A	16.6 A	14.6 A
Celebrity	17.1 B	13.2 B	13.1 B
Skyway	15.0 D	8.9 F	13.0 BC
Primo Red	15.0 D	9.9 E	12.4 BCD
Red Deuce	16.1 C	13.0 B	14.1 A
Red Morning	15.4 CD	10.7 D	12.0 D
BHN 589	15.0 D	11.6 C	12.3 CD
Mountain Merit	9.7 E	9.9 E	9.6 E

For 5 cultivars, dicamba-treated plants had lower yield than 2,4-D treated plants

FL-91 top cv for marketable yield when dicamba drift occurs

FL-91 & Red Deuce top cvs for marketable yield when 2,4-D drift occurs

Residue in Fruit

No residue was detected in any cultivar at 21 DAT

Maximum legal 2,4-D residue limit is 50 ppb

Currently no residue limit for dicamba

Other research using similar herbicide rates:

2,4-D: 50 ppb at 7 DAT, but 10 ppb at 14 DAT

Dicamba: 30 ppb at 7 DAT, but 10 ppb at 14 DAT



Susceptibility & Risk of Damage

Tomatoes are at a susceptible stage of development in late May and early June which coincides with applications of dicamba and 2,4-D on transgenic soybeans

Risk of herbicide drift onto tomato plants may be high, with crops loss when herbicide-tolerant soybeans are grown nearby

Plants may partially recover and herbicide residue may be below legal limit, but do you sell the fruit?



The Future...

Xtendimax, Engenia, and Tavium registrations expire in 2025

Enlist registrations expire in 2029

Enlist is restricted from use in:

Barton

Bates

Cedar

St. Clair

Vernon counties



Proactive Strategies

If your neighbor grows crops that might harm your production:

Register your site on Drift Watch website

Post specialty or organic crop signs

Plant an additional buffer zone

Plant most herbicide-tolerant crops next to agronomic crops

Visit with your neighbor about cropping plans



Document Damage

Document the damage with close-up photos

Record the date damage was first noticed

Record the no of plants damaged, their stage of growth or age, and varieties

Ex: 10 inch growth, bloom

Continue to document progression of plant damage

Flag 4 to 5 plants & take pictures weekly with recorded dates

Record yield of affected and non-affected plants



Compensation

Residue analysis to detect herbicide drift

Sample plants (30 g or 1 qt-size paper bag) overnight mail best

Mo Dept Ag uses State Hygienic Lab
Univ. of Iowa



South Dakota Ag Labs- \$162/sample for dicamba & DCSA
metabolite or acid panel (includes 2,4-D) for \$212
Glyphosate is separate test at \$212/sample

Questions?

