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Banvel and 2,4-D Damage to Fieldbeans and Soybeans

This NebGuide discusses the effects of Banvel and 2,4-D on soybean and fieldbean growth and yield.

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Banvel and 2,4-D are two herbicides commonly used for postemergence control of broadleaf weeds in corn, wheat, sorghum, pastures, and around field margins. Both herbicides can be moved off target by windy conditions at the time of spraying, or they can volatilize after spraying at temperatures above 85°F and drift off target. Fieldbeans and soybeans are both sensitive to Banvel and 2,4-D, and even rates as low as 0.001 lb/acre (1/100th of the use rate) can cause visual crop injury. The degree of crop injury depends on the herbicide, rate, and crop growth stage at the time of drift.

Symptoms

Fieldbeans and soybeans demonstrate characteristic bending and twisting of stems, tumor development, and crinkling of leaves within hours of being exposed to 2,4-D. Exposure to 2,4-D is usually detrimental to the bean plant, although at very low concentrations, it has been observed to actually increase plant height, leaf size, pod set, and yield.



Figure 1. Beans leaves exhibiting typical "growth regulator" herbicide injury caused by Banvel and 2,4-D.

The effects of Banvel on fieldbeans and soybeans are very similar to those of 2,4-D. They include multiple stem growth, bending of young shoots, and crinkling and cupping of leaves (*Figure 2*).

Drift damage in the field can usually be recognized by a characteristic pattern. Plants express symptoms in a gradient from one end of the field to the other. Plants nearest to the source of drift will show the greatest damage; this damage will become progressively less noticeable away from the source of drift.



Figure 2. Damage symptoms from Banvel exposure.

Susceptibility

Fieldbeans

Fieldbeans exhibit an increasing susceptibility to both 2,4-D and Banvel as they progress through the growing season. They are often capable of recovering from damage caused by 2,4-D and Banvel drift early in the growing season. Once the plants begin to flower, however, exposure to either herbicide may result in significant reduction in yield (*Table I*). Exposure to these herbicides after the beginning of flowering may also delay maturity beyond the growing season and adversely affect seed quality (coloration, coat cracking, and seed size) and reduce germination in the harvested seed. Fieldbeans appear to be more susceptible to Banvel than to 2,4-D. In general, Banvel causes damage earlier and at lower levels than does 2,4-D.

Table I. Yield response of fieldbeans as affected by herbicide, level of herbicide, and growth stage of fieldbeans.

Herbicide	Level (oz/acre)	Growth Stage ¹			
		Pre	2 Trf	E Blm	E Pod
		-----Percent Yield Reduction-----			
2,4-D	0.02	6	2	4	16
	0.16	2	5	9	20
	1.60	1	15	57	66
Banvel	0.02	12	0	16	23
	0.16	4	14	67	31
	1.60	17	71	94	98
Control yield 44 bu/acre					
¹ Growth stages are: Pre = preemergence, 2 Trf = second trifoliate leaf, E Blm = early bloom, and E Pod = early pod.					

Soybeans

The susceptibility of soybeans to 2,4-D and Banvel damage also varies with the rate of the herbicide applied and the growth stage when the plant is exposed to these herbicides. In general, damage increases with

increasing rates of the herbicides and increasing age of the plants. It has been observed that 2,4-D and Banvel can cause reductions in yield when applied to soybeans during the flowering stage (*Table II*). Soybeans also exhibited yield reductions when treated with Banvel during the prebloom stage of growth. Soybeans treated with Banvel during podfill produced seed with reduced germination.

Fieldbeans appear to be more susceptible than soybeans to lower rates of both 2,4-D and Banvel. This may indicate a slightly greater tolerance of soybeans to these herbicides as compared to fieldbeans.

Table II. Yield response of soybeans as affected by herbicide, level of herbicide, and growth stage of soybeans.¹

Herbicide	Level (oz/acre)	Growth stage	
		Prebloom	Bloom
		Percent Yield Reduction	
2,4-D	0.25	0	0
	0.50	1	3
	1.00	6	8
	2.00	4	8
Banvel	0.03	9	18
	0.12	15	14
	0.25	7	20
	0.50	14	51
	1.00	19	74
Control yield 40 bu/acre			

¹ Amended from: Wax, L.M., L.A. Knuth, and F.W. Slife. 1969. "Response of soybeans to 2,4-D, dicamba, and picloram." *Weed Sci.* 17:388-393.

Prevention

The use of 2,4-D or Banvel postemergence in cropland adjoining fieldbean or soybean fields poses a potential risk to these crops. To minimize this risk, these herbicides must be used with caution.



Figure 3. Banvel (left) and 2, 4-D-exposed leaves compared with those of healthy plants.

Susceptibility

Application of either of these herbicides should be avoided in bean production areas once the bean plants begin to flower (approximately the beginning of July). Applications made earlier in the season should be made in the early morning or evening then wind speeds are below 7 mph, relative humidities are generally higher, and air temperature is lower. Applications made under these conditions are less likely to drift from the area of application and cause damage to neighboring bean fields.

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