



SOYBEAN FACTS

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Impact of Winter Annual Weeds in No-Till Soybean

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Winter annual weeds have become more prevalent in Michigan soybean fields as a result of conservation tillage. The use of glyphosate-resistant soybean has also contributed to an increased reliance on glyphosate and therefore a reduction in the use of residual herbicides. Although glyphosate provides excellent preemergence control of many weeds, timing as well as the addition of residual herbicides before planting are important for early-season weed control. In addition, some winter annual weeds can act as alternate hosts for early-season pests such as soybean cyst nematode (SCN). Effective control of winter annual weed host species may be important to reduce populations of SCN. The following recommendations are based on MSU research funded by the Michigan Soybean Promotion Committee (MSPC).

Timing of preemergence applications using growing degree days (GDD)

Preemergence applications are important for effective early-season weed control in no-till soybean. Growing degree days (GDD) may be used to determine the appropriate application time for effective control of winter annual and early summer annual weeds. Growing degree days are calculated by adding the daily high and low temperature and dividing that number by 2. The base temperature (34 F) is subtracted from that value to determine the number of GDD that have accumulated at that particular date. A base temperature of 34 F was used because many winter annual and early summer annual weeds can germinate at this temperature. The Michigan Automated Weather Network website will calculate GDD for weather stations located throughout the state (www.agweather.geo.msu.edu/mawn/). In studies conducted at MSU and at grower's fields

in St. Joseph County, applications applied after 275 GDD (within 30 days of planting) provided excellent control of all weed species at planting.

Winter annual weeds as alternate hosts for soybean cyst nematode

Common chickweed, field pennycress, henbit, and purple deadnettle all began flowering between 375 and 475 GDD (20-30 days prior to planting, mid-May planting date). Therefore, herbicide applications made prior to these dates may help reduce seed production of these winter annuals. If these weeds are allowed to produce seed, these species may increase their prevalence in the future. Even though we have not found SCN reproduction on any of the winter annual weeds that we have sampled from the field, other states have reported that SCN is successfully able to reproduce on purple deadnettle under field conditions. In addition, greenhouse work has indicated that SCN can also reproduce on henbit, field pennycress, and shepherd's-purse. Controlling winter annual weeds that may potentially act as alternate hosts, may be important in managing populations of SCN.

Residual herbicides improve control of winter and early-summer annual weeds

Studies conducted at MSU and in grower's fields in St. Joseph County indicated that herbicides that have residual activity applied prior to 875 GDD in reducing mid-season weed biomass (Table 1). Although there were differences in weed control and mid-season biomass, none of the treatments reduced yield except for the non-treated control. However, the use of herbicide treatments with residual activity can extend early-season weed control and reduce in-season weed growth. There are several effective



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herbicides with residual activity that can be applied in a burndown application to control winter annuals and early-season summer annuals. For a complete listing of soybean herbicides with residual activity consult Table 2G in the MSU Extension publication E-434 *“Weed Control Guide for Field Crops”*.

Table 1. Mid-season biomass (late-June) comparing herbicide treatments with and without residual activity applied by GDD in the spring.

Application timing by GDD ^a	Herbicide treatment	Biomass
days prior to planting		—g/m ² —
Fall (mid-November)	Residual ^b	70
Fall (mid-November)	No-residual ^c	320
175-275 GDD (40-70 days)	Residual	15* ^e
175-275 GDD (40-70 days)	No-residual	70
275-375 GDD (30-40 days)	Residual	4*
275-375 GDD (30-40 days)	No-residual	57
375-475 GDD (20-30 days)	Residual	5*
375-475 GDD (20-30 days)	No-residual	29
675-775 GDD (10-20 days)	Residual	1*
675-775 GDD (10-20 days)	No-residual	13*
875-1175 GDD (0-7 days)	Residual ^d	5*
875-1175 GDD (0-7 days)	No-residual ^d	28
Non-treated		136

^a Growing degree days (GDD) were calculated using base 34 F.

^b Residual herbicide treatment: Canopy EX (2.2 oz/A) + Roundup WeatherMax (22 fl oz/A) + 2,4-D ester (1 pt/A) + AMS (17 lb/100 gal)

^c No-residual treatment: Roundup WeatherMax (22 fl oz/A) + 2,4-D ester (1 pt/A) + AMS (17 lb/100 gal)

^d 2,4-D ester at 1 pt/A was not included at this timing. There is a 7 day restriction for 2,4-D ester (1 pt/A) applications prior to planting soybean

^e Treatments with an asterisk (*) significantly reduced mid-season weed biomass

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