The Oklahoma Cooperative Extension Service

WE ARE OKLAHOMA

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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EXTENSION

Smallseed Falseflax Management in Winter Wheat

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Smallseed Falseflax Identification and Biology

A native to Europe, smallseed falseflax (*Camelina microcarpa* Andrz. Ex DC.) was first introduced to North America in the 19th century, likely as a contaminant in flax seed (*Linum usitatissimum* L.) and other crops (Francis and Warwick 2009). Since its introduction, it has become a common weed found in agricultural crops but has recently been considered as a potential oil seed crop. As a pest, it is most commonly found in the southern Great Plains in cool-season crops such as winter wheat. Although falseflax has not been noted by producers in Oklahoma to be of high economic importance, it is still an undesired species competing on a wide geographical area.

Falseflax can appear similar to horseweed (*Conyza canadensis* L.), a weed that has a considerable impact on agriculture (See Fact Sheet PSS-2793, Horseweed Management in Oklahoma Winter Wheat). Much like horseweed, falseflax is a winter annual that develops a basal rosette covered in dense hairs (Figure 1). However, the rosette leaves are not lobed like horseweed. As falseflax matures, it develops an erect stem that is either simple or branched and can reach one meter in height. Like many species in the Brassicaceae family, it has a raceme inflorescence with a terminal cluster of small, four-petaled, pale yellow flowers. Once pollinated, these flowers develop into small, pear-like siliques or "pods" (Figure 2). Falseflax is capable of producing almost 13,000 seeds per plant (OA Stevens 1957). These seeds could result in potential dockage issues at the grain elevator.

Smallseed Falseflax Chemical Management

Other potential reasons for concern of falseflax presence outside of crop competition include herbicide resistance and potential out-crossing with other mustard species. Through a

Figure 1. More lobed horseweed leaves (A) and less lobed, hairier smallseed falseflax leaves (B).

Figure 2. Close-up of smallseed falseflax pear-like reproductive structure.

whole plant dose-response study, Hanson et al. (2004) confirmed acetolactate synthase (ALS) resistance to metsulfuron (Ally® XP) and chlorsulfuron (Glean® XP) occurring naturally in a falseflax population in Oregon. This was the result of a single point mutation within falseflax that, in other studies, resulted in resistance to four of the five chemical groups that make up the ALS site of action (Hanson et al. 2004; Tranel and Wright 2002). Use of ALS herbicides in small grain producing regions is high and therefore the continued selection of herbicide resistant biotypes is of great concern.

Management of falseflax in grain-producing cereal crops can be accomplished in several ways. Control of many broadleaf weeds is achieved most commonly by the use of either ALS inhibiting herbicides, synthetic auxin herbicides or mixtures of the two sites of action; however, few studies have evaluated falseflax response to various herbicides. According to an OSU Extension fact sheet (PSS-2787, Weedy Mustards of Oklahoma), Ally®, Beyond® (in CL and CL+ Wheat), Olympus®, Outrider®, PowerFlex® HL and premixes of Quelex®, Finesse® Cereal & Fallow and Sentrallas® are all effective at controlling falseflax that is not ALS resistant. Other herbicide options include synthetic auxin herbicides like 2,4-D, dicamba or 4-Hydroxyphenylpyruvate dioxygenase (HPPD)/ Photosystem II (PS II) premixes like Huskie® or Talinor®. One trial was conducted at the OSU North Central Research Station during the 2016-17, 2017-18 and 2019-20 winter wheat growing seasons. The goal of the study was to evaluate smallseed falseflax control with previously available products as well as newer products. The herbicides and rates used are included in Table 1.

Field Research Findings and Recommendation

Averaged across years, falseflax control was 88% or greater for all treatments with no statistical separation (Figure 3). Numerically, all treatments achieved 95% control or greater except Talinor® and Quelex + Powerflex® HL, which both provided 90% control of falseflax. Control with dicamba was at 88%. Herbicide treatment also did not affect grain yield.

A major benefit from the relatively high level of falseflax control provided by all herbicide treatments is that producers battling falseflax have several options. They also have options with a relatively wide range in price as dicamba or 2,4-D alone can cost less than $2.00 per acre for the herbicide. The high efficacy of the treatments tested allows winter wheat producers the opportunity to rotate through the use of multiple herbicide sites of action to control falseflax, thus reducing the potential to select for herbicide resistance in this species. Additionally, due to the high efficacy of all treatments containing an ALS herbicide, herbicide resistance is not suspected in this population contrary to what Hanson et al. (2009) found in the previously mentioned population in Oregon.

References

Francis A, Warwick SI (2009) The biology of Canadian weeds. 142. Camelina alyssum (Mill.) Thell.; *C. microcarpa* Andrz. ex DC.; C. sativa (L.) Crantz. Can. *J Plant Sci* 791-810

Hanson BD, Park KW, Mallory-Smith CA, Thill DC (2003) Resistance of *Camelina microcarpa* to acetolactate synthase inhibiting herbicides. *Weed Res* 44:187-194

Stevens OA (1957) Weights of seeds and numbers per plant. *Weeds* 5:46-55

Tranel PJ, Wright TR (2002) Resistance of weeds to ALS-inhibiting herbicides: what have we learned? *Weed Sci* 50:700-712

Table 1. Herbicides and application rates used to control smallseed falseflax in winter wheat from 2016 to 2020.

Herbicide common names	*Brand names or designations*	*Application rates (per acre)*
2,4-D Ester	2,4-D LV 6	5.7 fl oz (in tank-mix) 10.7 fl oz (alone)
Bicyclopyrone + bromoxynil	Talinor®	18.2 fl oz
Dicamba	Banvel®	2 fl oz (in tank-mix with Ally® XP) 4 fl oz (alone, in tank-mix with Finesse® or Sentrallas®)
Halauxifen + florasulam	Quelex®	0.75 oz
MCPA Ester	MCPA Ester 4	10.8 fl oz (in tank-mix with Quelex®) 17.3 fl oz (in tank-mix with Finesse®)
Metsulfuron	Ally® XP	0.1 oz
Chlorsulfuron + metsulfuron	Finesse® Cereal & Fallow	0.4 oz
Pyroxsulam	PowerFlex® HL	2 oz
Thifensulfuron + fluroxypyr	Sentrallas®	10 fl oz

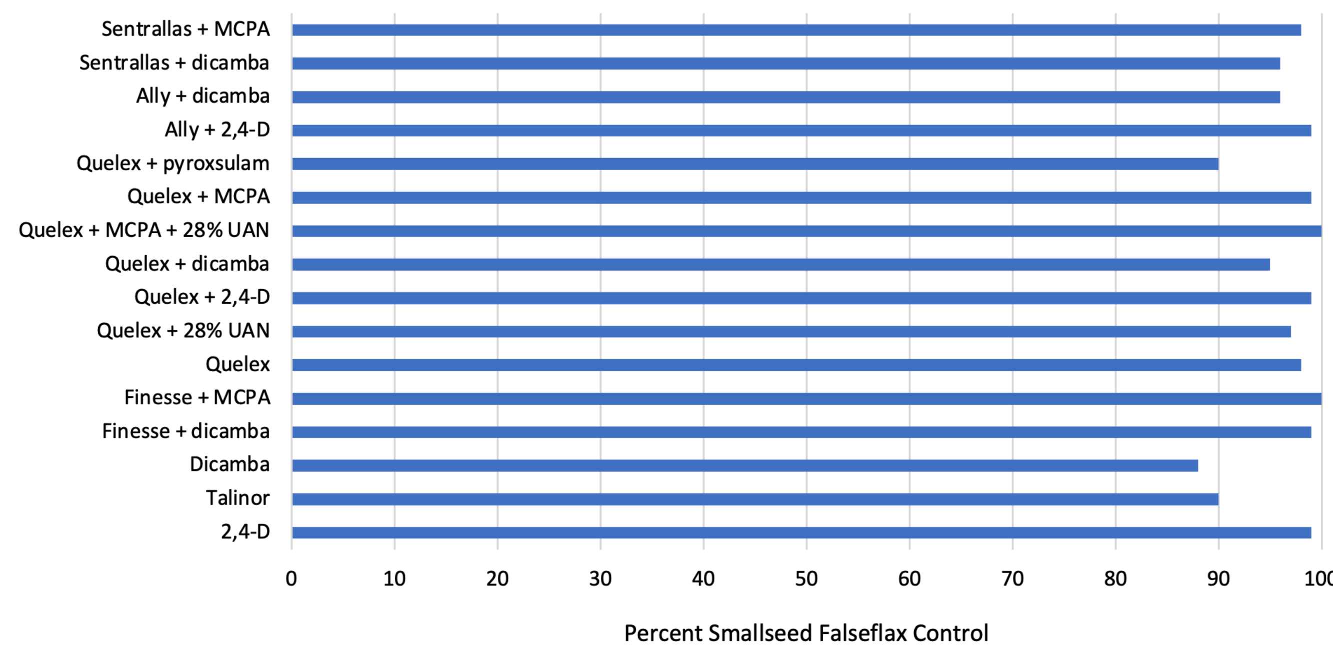

Figure 3. End-of-season smallseed falseflax control following applications of 1- to 3-inch rosettes at the OSU North Central Research Station during the 2016-17, 2017-18 and 2019-20 winter wheat growing seasons. All treatments that included an ALS herbicide were applied in tank-mix with NIS at 0.25% vol/vol. Water was used as the sole carrier except where '28% UAN' is noted.