



Triticale variety and seeding rate affect wheat stem sawfly survival and parasitism

CATEGORY [insects](#) | November 24, 2022

AC Ultima formed relatively solid stems at lower internodes compared to Pronghorn, although this did not reduce stem cutting by wheat stem sawfly. Higher seeding rates of both cultivars resulted in lower wheat stem sawfly damage and higher amounts of sawfly parasitism.

Little research has been conducted on wheat stem sawfly (*Cephus cinctus* Norton) in triticale, despite this insect being a native pest of wheat on the Prairies since the late 1800s. Wheat stem sawfly causes damage to triticale in the form of reduced seed production due to the larvae tunnelling inside the stem, as well as from stem lodging after the larvae migrate to the base of the plant and girdle the stems to form overwintering chambers.

Previous research has found stem lodging by wheat stem sawfly in triticale to exceed 50% in years of high insect pressure, damage that is comparable to susceptible wheat varieties. Thicker stems, like those of triticale, also produce a higher number of female sawflies that emerge from the stems, contributing to a female-dominated sawfly population that could cause further pest issues the following year. The primary parasitic wasp of wheat stem sawfly, *Bracon cephi* (Gahan), plays a key

role in keeping its host population in check; however, little is known about its parasitism levels of wheat stem sawfly in triticale.

Research was conducted in 2008 and 2009 to compare wheat stem sawfly damage between two commonly grown triticale varieties (Pronghorn and AC Ultima) at two different seeding rates. While this is an older study, it is still relevant for today's triticale production.

The low seeding rate was 20 seeds/ft² (200 seeds/m²) and the high (recommended) seeding rate was 40 seeds/ft² (400 seeds/m²). Since wheat stem sawfly and triticale production overlap in the Brown soil zone, the experimental site was located near Lethbridge, AB, at a dedicated wheat stem sawfly research site established by Agriculture and Agri-Food Canada since the late 1960s. The site is no-till, following a wheat-chemical fallow rotation. At harvest time, stem cutting damage, stem pith development, stem infestation by wheat stem sawfly larvae, and sawfly larvae parasitism were assessed.

Pith expression can differ between varieties

The pith, or the spongy cells in the centre of cereal plant stems, can vary in its development between different cereal cultivars. The amount of pith expression exhibited by a plant determines how solid the stem becomes, with solid-stemmed varieties exhibiting a high amount of pith expression, hollow-stemmed varieties a low amount, and semi-solid varieties in between. Solid-stemmed cereal varieties provide control of wheat stem sawfly larvae due to the developing pith crushing eggs and very small larvae. In addition, older larvae are less successful in migrating to the crown area to construct their overwintering chambers so stem lodging is reduced, helping to preserve crop yield. It should be noted that weather plays a key role in the amount of pith expression that even solid-stemmed varieties exhibit. Pith expression is greatest under bright, sunny conditions during stem elongation, and is poorest under cloudy, rainy conditions at this growth stage.

Between the two triticale cultivars, the average pith expression was slightly higher in AC Ultima than in Pronghorn. Specifically, AC Ultima had more pith expression in the lower parts of the stems (first internode) compared to Pronghorn. In this study sawfly pest pressure was not high enough to note major differences in cutting between the two cultivars that could be attributed to the differences in solid pith.

Higher seeding rates = less cutting

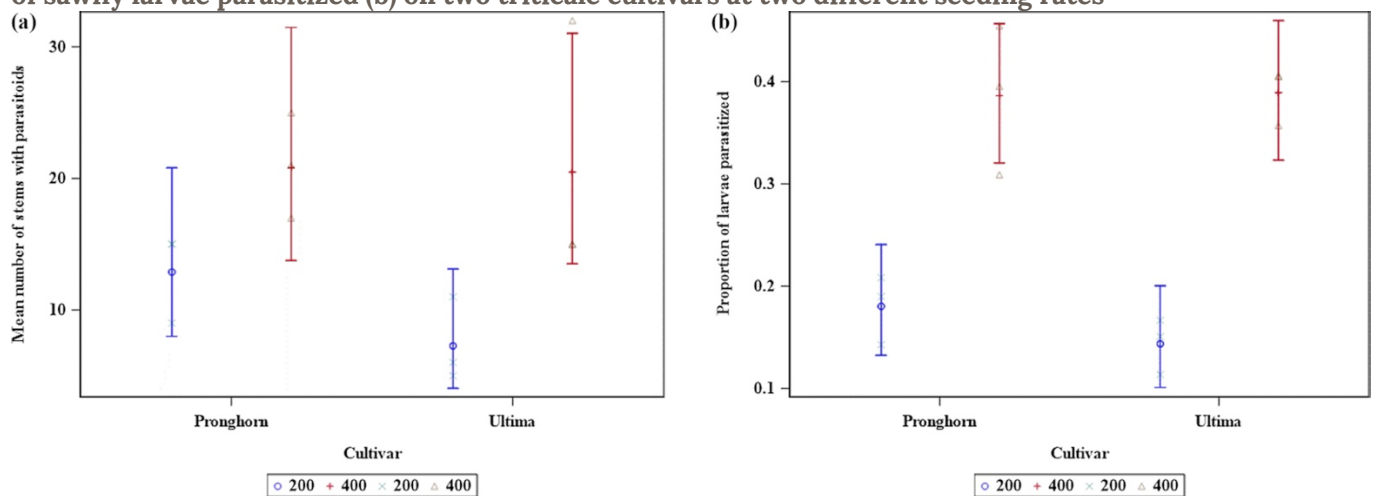
Wheat stem sawfly pressure, and therefore stem cutting, was low in 2008 (less than 10% of stems were infested) and moderate to high in 2009. In 2008, there were no differences in cut stems between seeding rates and cultivar. However, in 2009, there was significantly less stem cutting at the high seeding rate compared to the low seeding rate, particularly for Pronghorn. Previous research found that wheat stem sawfly adults prefer to lay eggs in taller plants and lay more female eggs in thicker stems. It was suspected that the lower seeding rates resulted in taller plants with thicker stems due to less competition within the crop, thus creating a more favourable host plant environment for the sawflies.

Higher seeding rates = more parasitism

Bracon cephi populations were very low in 2008; therefore, results pertaining to parasitism were based only on 2009. Higher seeding rates significantly increased parasitism of wheat stem sawfly larvae (Figure 1). Parasitic wasp numbers were the lowest in the AC Ultima low seeding rate plots where parasitism was found in only 7 out of 100 stems compared to an average of over 20 out of 100 stems for both cultivars at the high seeding rate.

Cocoons containing mature larvae of second generation *Bracon cephi* were consistently found in the 2nd internode in both cultivars and seeding rates. This observation serves as a reminder that to preserve this parasitoid, stubble should be cut as high as possible at harvest to ensure higher parasitoid survival.

The mean number of triticale stems with parasitoids, *Bracon cephi*, in 2009 (a) and the proportion of sawfly larvae parasitized (b) on two triticale cultivars at two different seeding rates



Source: Cárcamo et al. 2021

To minimize yield loss from wheat stem sawfly in triticale, higher seeding rates should be used to create a less favourable environment for females to lay eggs and to encourage parasitism by *Bracon cephi*. Differences in pith development were found between the two cultivars studied, with AC Ultima showing stronger pith expression and a more solid stem at the lower internodes than Pronghorn, although no differences in stem cutting were observed between cultivars in this study. Developing varieties that exhibit solid stems and agronomic integration with biological control will be key management strategies for wheat stem sawfly in triticale.

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Photo: Wheat stem sawfly adult (male) Credit: H. Goulet.