

# STUDY ON THE SENSITIVITY OF THREE OAT VARIETIES TO THE SADDLE GALL MIDGE, *HAPLODIPLOSIS MARGINATA* (Diptera : Cecidomyiidae)

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## CONTEXT & OBJECTIVES

The saddle gall midge, *Haplodiplosis marginata* (von Roser) is a univoltine pest of cereals which occurs in Europe. The larvae feed on stems and engender saddle-shaped depressions, driving to yield losses.

After 40 years without any reporting (De Clercq & D'Herde 1972), large populations of *H. marginata* and important damage have been observed since 2010 in wheat crops in Belgium, especially in the Flemish Polders, where clay soils and intensive farming of cereals favour heavy infestations.

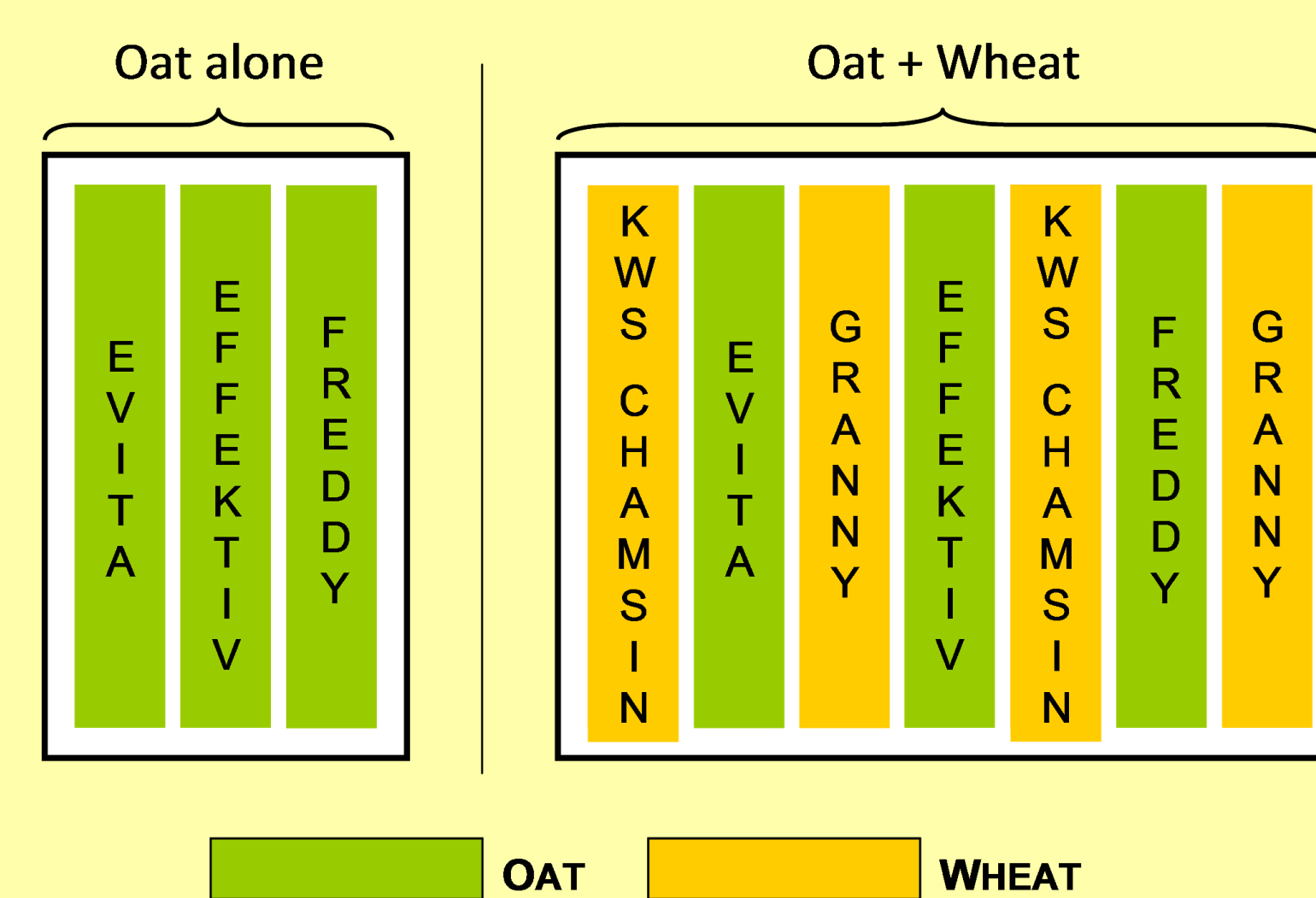
According to some research conducted in the 60s during the last outbreaks, oat (*Avena sativa* L.) is known to be one of the less attractive hosts to the saddle gall midge (Nijveldt & Hulshoff 1961, De Clercq & D'Herde 1972, Golightly 1979, Skuhravy et al. 1993). Our study was thus performed in order to assess the host sensitivity of three oat varieties currently grown in Belgium : EVITA, EFFEKTIV and FREDDY.



Female of *H. marginata* laying eggs

## METHODS

- Oat varieties were sown on infested soil in a glasshouse, according to 2 treatments :
  - Only the 3 oat varieties were grown → « Oat alone »
  - This 3 oat varieties, grown together with 2 varieties of spring wheat (GRANNY and KWS CHAMSIN) → « Oat + Wheat »
- During the experimentation, 2 parameters were measured :
  - The percentage of leaves with egg clusters
  - The number of galls on each stem
- Statistical analyses were made using likelihood ratio tests (Analysis of Deviance Tables)



Larvae of *H. marginata* and saddle-shaped galls on a stem

## RESULTS

➤ Mean percentage of leaves with eggs of *H. marginata* for the 3 oat varieties grown alone, and for these varieties grown together with the 2 spring wheat varieties :



X = Mean (± Standard Error) ○ = observed value

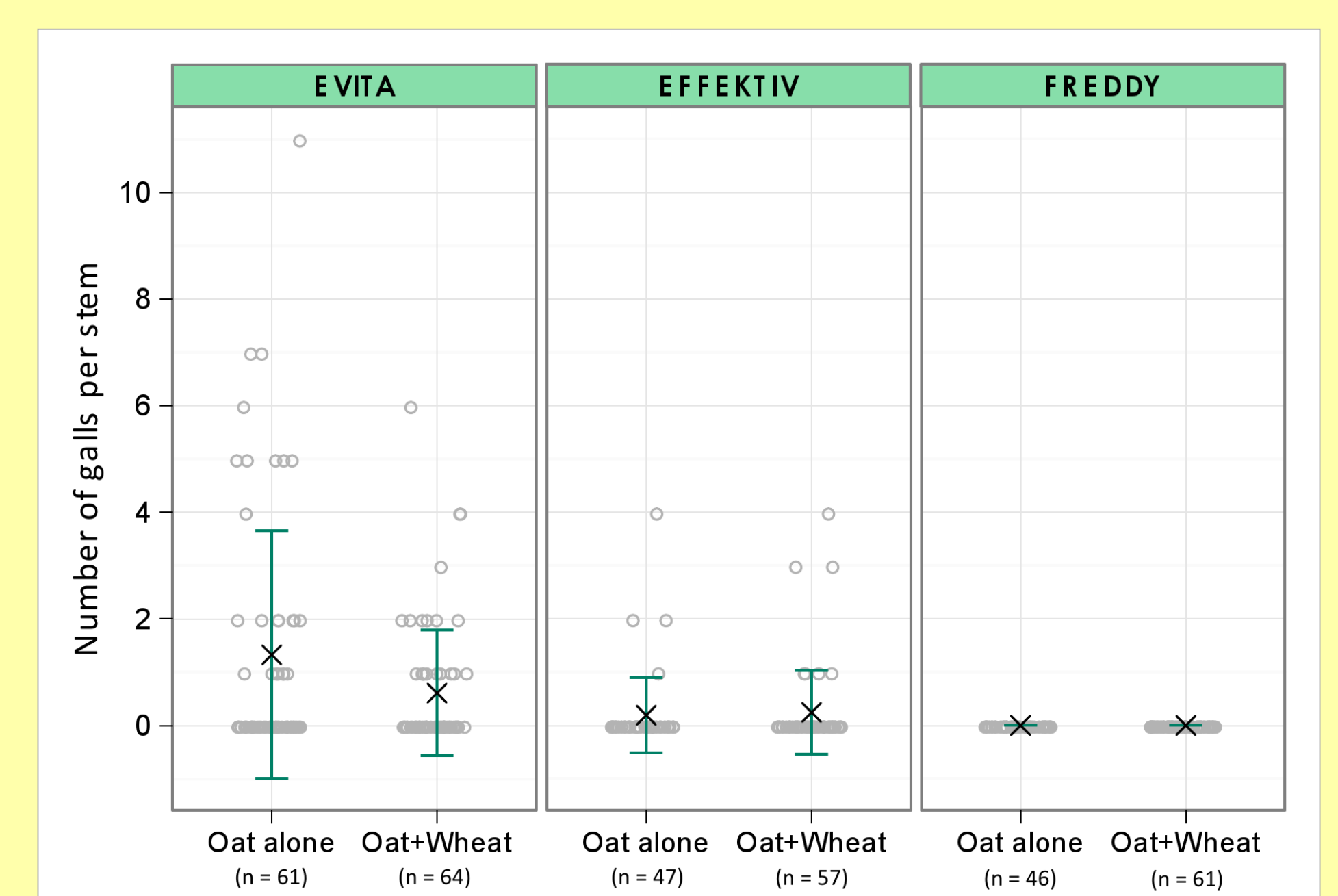
Effect of variety and treatment on percentage of leaves with eggs (for oat only) :

	LR ( $\chi^2$ )	Df	P
Variety	2.93	2	0.231
Treatment (alone vs with wheat)	28.60	1	8.9e-08***
Variety x Treatment	5.50	2	0.064

Comparison of egg laying levels between species (treatment « Oat + Wheat » only) :

	LR ( $\chi^2$ )	Df	P
Species (oat vs wheat)	138	1	< 2e-16***

➤ Mean number of galls per stem for the 3 oat varieties grown alone or with 2 spring wheat varieties :



X = Mean (± Standard Error) ○ = observed value

Effect of variety and treatment on number of galls :

	LR ( $\chi^2$ )	Df	P
Variety	19.69	2	5.3e-05***
Treatment (alone vs with wheat)	4.34	1	0.037*
Variety x Treatment	1.71	1	0.191

## DISCUSSION

- ✓ The infestation was significantly lower on oats when they were in presence of wheat, according to the percentage of leaves with eggs. The infestation level was also significantly higher on wheat than on oat.

⇒ OAT SEEMS TO BE A MUCH LESS FAVOURED HOST PLANT THAN SPRING WHEAT FOR EGG LAYING

- ✓ Oat varieties are significantly different regarding the number of galls per stem, but with very little damage compared to wheat. FREDDY variety even seemed to be completely resistant to saddle gall midge, as no galls were observed although there were a similar percentage of leaves with eggs for the three oat varieties.

⇒ OAT INDUCED A LARGE OR EVEN TOTAL FAILURE OF THE LARVAE DEVELOPMENT

- ✓ Cropping oat could thus contribute to reduce or even eliminate infestations of *Haplodiplosis marginata*.