



# Leaf miner on wheat: What should be done?

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What seems to be a few yellow larvae inside a wheat leaf in the year 2000, was the start of a new pest on wheat and barley. However, researchers are not certain if it is a pest...

Yellow leaf miner larvae were found in wheat leaves during 2000 in the Douglas and Prieska areas. The insect, identified as *Agromyza ocularis* (Photo 1), is an indigenous grass leaf miner fly that was originally described from natural vegetation in the Ceres, Giant's Castle and Maseru areas.

Today, this fly is known on wheat and barley in almost all irrigated wheat production areas in South Africa. Since 2016, leaf miners have been present on dryland wheat in the Western Cape, which present a different situation to what we have encountered thus far. Infestation in this area started in the Heidelberg area, but spread through the whole production area, including the Swartland.

The female fly lays eggs inside host plant leaves and the larva mines inside the leaf, causing dead leaf tissue (Photo 2). Leaf mines develop firstly in the older leaves of the plant, since eggs tend to be pushed out of actively growing leaf tissue, giving them no chance to survive.

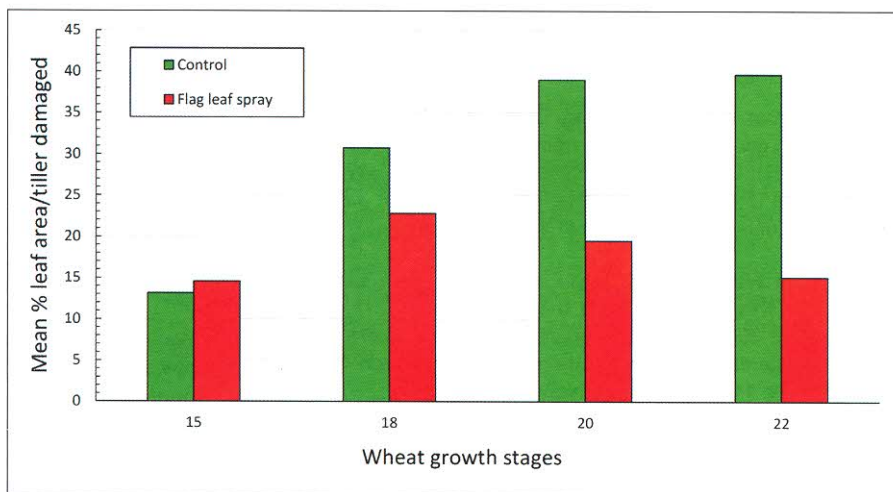
Visible leaf damage on irrigated plants can sometimes be serious, but yield loss, however, seems to be small, which renders it difficult to establish control measures.

## Strong survival

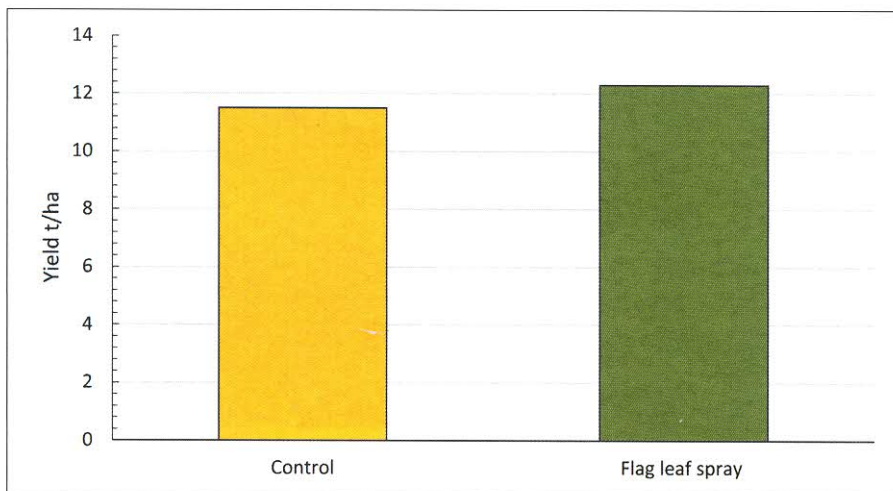
This leaf miner has several characteristics built into its life cycle which could favour its survival under difficult circumstances. One is a diapause (resting stage), which could last for up to ten months. This occurs during the pupal stage, which is mostly present in the first 5 cm of top soil.

About 50% of the pupae will hatch into flies within about 23 days at a temperature of 25°C (Adendorff, 2010). The rest of the pupae will stay in the soil and will hatch occasionally over the next nine months.

Flies are therefore able to survive if small numbers of volunteer wheat, alternate hosts and natural grass become available. This could cause several successive populations in a wheat field, complicating control.



Graph 1: A flag leaf spray treatment reduced the percentage leaf area damage per tiller.



Graph 2: Yield increase caused by flag leaf spray treatment.

## Infestation pattern in Western Cape

In the Western Cape, infestation is found early on new emerging wheat during May and specifically when it is dry. Drought causes reduced growth of the then very small plants. Fly eggs, laid in these small leaves, will hatch and larvae are able to grow and survive.

In the early growth stages, the yield characteristics (like numbers of tillers and kernels) become fixed and damage could influence yield potential. However, under dry conditions, plant development also slows down and damage to leaves may not have such a big influence.

A larval cycle is completed at 25°C (constant) within four to five days. However, with fluctuating temperatures in the field, duration could be extended up to ten days. Mature larvae leave the plant and pupate in the soil. The size of larvae should therefore be accounted for when considering chemical control.

A high percentage of mature larvae may mean that they will pupate in probably the next 48 hours. At this stage, maximum damage has already been suffered by the plant and a chemical application will not remedy the situation. On the other hand, if spraying is delayed until after the larvae leave the plant to pupate, the treatment of 'empty' leaves will be fruitless.

**TABLE 1: POTENTIAL YIELD LOSS (%) ON WHEAT THAT COULD BE EXPERIENCED WHEN PERCENTAGE LEAF AREA LOST ON THE UPPER TWO LEAVES OF WHEAT ARE CORRELATED WITH THE PERCENTAGE INFESTED TILLERS PER FIELD.**

% INFESTED TILLERS/FIELD	PERCENTAGE LEAF AREA LOST									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10	0,34	0,68	1,02	1,36	1,70	2,03	2,37	2,71	3,05	3,39
20	0,68	1,36	2,03	2,71	3,39	4,07	4,75	5,42	6,10	6,78
30	1,02	2,03	3,05	4,07	5,09	6,10	7,12	8,14	9,15	10,17
40	1,36	2,71	4,07	5,42	6,78	8,14	9,49	10,85	12,20	13,56
50	1,70	3,39	5,09	6,78	8,48	10,17	11,87	13,56	15,26	16,95
60	2,03	4,07	6,10	8,14	10,17	12,20	14,24	16,27	18,31	20,34
70	2,37	4,75	7,12	9,49	11,87	14,24	16,61	18,98	21,36	23,73
80	2,71	5,42	8,14	10,85	13,56	16,27	18,98	21,70	24,41	27,12
90	3,05	6,10	9,15	12,20	15,26	18,31	21,36	24,41	27,46	30,51
100	3,39	6,78	10,17	13,56	16,95	20,34	23,73	27,12	30,51	33,90



- ▲ 1: An adult leaf miner fly.
- ▼ 2: A leaf miner larva inside a leaf.
- ▲ 3: Lower infested leaves dying off.

