Annexure: C

Fall Armyworm damage assessment procedure

The FAW attacks plants such as maize at all stages of the plants development, however the larvae develop rapidly and survive better when it is feeding on actively growing and developing maize plant parts. The damage caused is therefore dependent on the development stage of the plant, the severity (larvae density) per plant and the development age of the larvae. Damage can therefore be severe on younger (actively growing maize leaves, tassels and developing cobs). In some situations larvae can behave as cutworms to kill seedlings.

As little as 5 larvae per plant can reduce yield by 6% in maize. Direct estimation of yield loss is time-consuming and few such studies have been made. Severe feeding damage negatively impacts subsequent plant development as well as the development of reproductive plant tissue. The amount of yield loss may depend on the type tissue the larvae feed upon at later stages and some compensatory growth is possible under favorable growing conditions. If larvae tunnel into the stem and begin feeding on tissue that will become the tassel or ear yield losses could be substantial.

Damage assessment in the affected maize field should be done by the provincial personnel/farmers in the affected area.

The following procedures can be followed during damage assessment:

Walk in the field and scout for damaged/injured leaves and ears

- Select 20 consecutive plants in a random row.
- Note that larvae act similar to cutworms, in early infestations on plants less than 15 cm by damaging plants below soil level. Plants are stunted with leafs not 100% unfolded and deformed
- Open maize leaves/plants/cobs to detect FAW larvae on older maize plants more than 15cm high
- Count the number of FAW larvae per plant. A Mean infestation level of 3 or more fall army worms per plant found in 20 damaged plants/ 100 can cause economic damage and reduce yield loss
- If leaf damage is detected an additional 20 plants must be inspected at five different places in the field. The percentage is then calculated of plants damaged.
- Consider insecticide application when 20% of whorl-stage plants are infested with live larvae.

1. Ratings on damage caused by FAW on leaf

The visual ratings of damage can be done based on the number and size of lesions on the leaves.

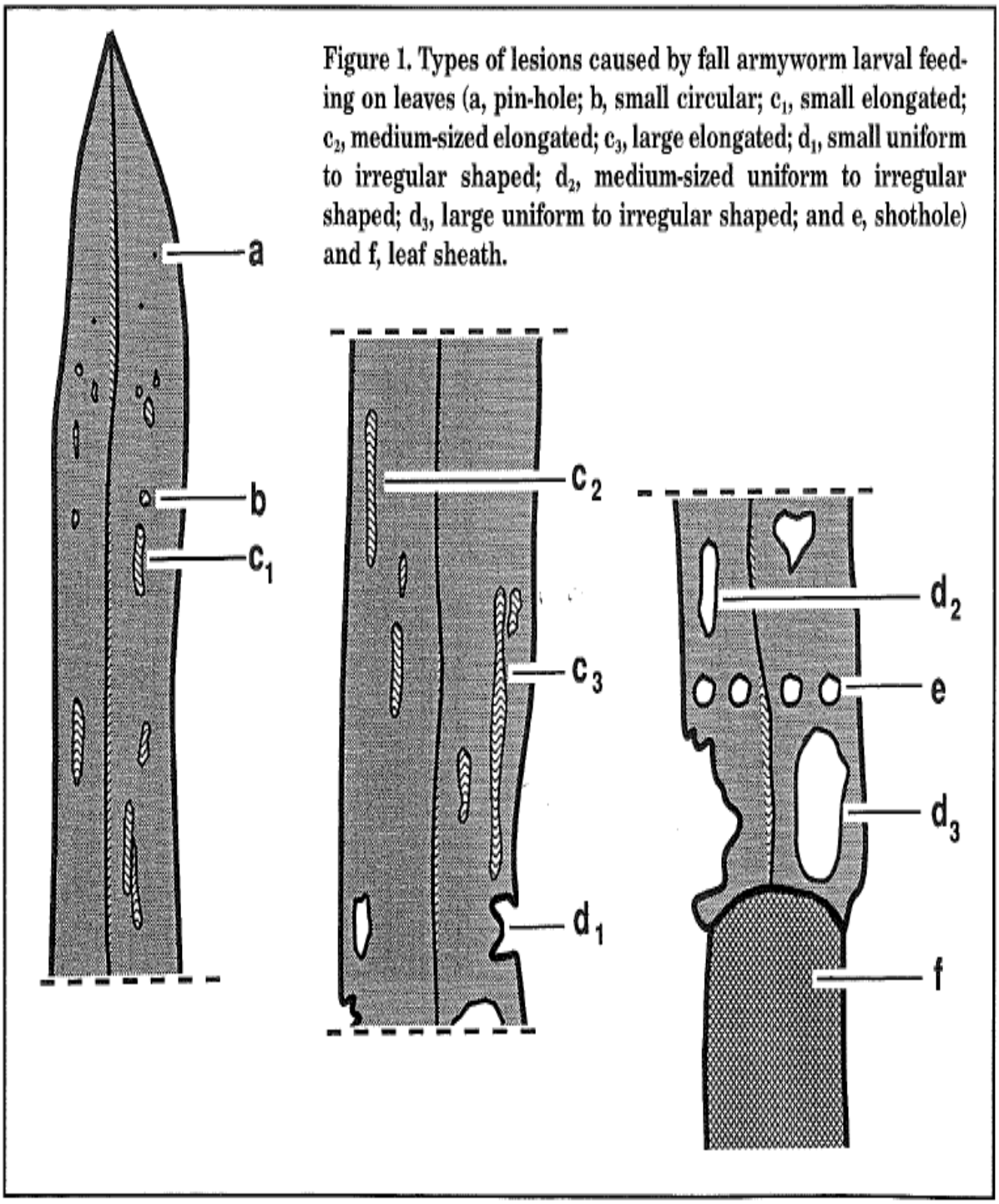

Figure 1: Visual rating scales for screening whorl-stage corn for resistance to fall armyworm (Davis and Williams, 1992).

The above illustrated degrees of damage to leaves can also be summarised into a damage scale (Table 1):

2. Damage ratings

2.1 Ratings on damage caused by FAW on maize leaves.

Leaf damage can be visually rated on 20 randomly selected plants from 5 different locations in the field on the following scale:

Table 1: Indicating leaf damage rating scale

Explanation/definition of damage	Rating
No visible leaf damage;	0
Only pin-hole damage	1
Pin-hole and small circular hole damage to leaves	2
Pinholes, small circular lesions and a few small elongated (rectangular shaped) lesions of up to 1.3 cm in length present on whorl and furl leaves.	3
Several small to mid-sized 1.3 to 2.5 cm in length elongated lesions present on a few whorl and furl leaves	4
Several large elongated lesions greater than 2.5 cm in length present on a few whorl and furl leaves and/or a few small- to mid-sized uni-form to irregular shaped holes (basement mem-brane consumed) eaten from the whorl and/or furl leaves.	5
Several large elongated lesions present on sever-al whorl and furl leaves and/or several large uniforms to irregular shaped holes eaten from furl and whorl leaves.	6
Many elongated lesions of all sizes present on several whorl and furl leaves plus several large uniform to irregular shaped holes eaten from the whorl and furl leaves.	7
Many elongated lesions of all sizes present on most whorl and furl leaves plus many mid- to large-sized uniform to irregular shaped holes eaten from the whorl and furl leaves.	8
Whorl and furl leaves almost totally destroyed	9

2.2 Ratings on damage caused by FAW on corn ear and kernel where FAW is already present on plants

Ear damage can be visually rated before harvest and before the grain has dried off on 10 randomly selected ears from 20 randomly selected plants from 5 different locations in the field on the scale indicated in Table 2.

Table 2: Indicating maize ear and kernel rating scale

Explanation/definition	Rating
No damage to any ears;	1
Tip (<3cm) damage to 1-3 ears	2
Tip damage to 4-7 ears	3
Tip damage to 7 and more ears and damage to 1-3 kernels below ear tips on 1 to 3 ears	4
Tip damage to 7 and more ears and damage to 1-3 kernels of 4 to 6 ears	5
Ear tip damage 7-10 ears and damage to 1-4 kernels below tips of 7 to 10 ears.	6
Ear tip damage to 7-10 ears and damage to 4-6 kernels destroyed on 7-8 ears.	7
Ear tip damage to all ears and 4-6 kernels destroyed on 7-8 ears.	8
Ear tip damage to all ears and 5 or more kernels destroyed below tips of 9-10 ears.	9

3. Summary of classification of damage rating

Table 3: Indicating leaf damage rating scale /classification

Explanation/definition of damage	Rating scale
Minimal visible leaf damage; (**Low**)	0-4
Marginal leaf damage (**Medium**)	5-7
Extensive leaf damage (**High**)	8-9

Table 4: Indicating corn ear and kernel rating scale /classification

Explanation/definition	Rating scale
minimal damage to any ears (**Low**)	1-4
Kernels and ears damaged (**Medium**)	5-7
Ear and kernels extensively destroyed (**High**)	8-9

- Formula for calculation of damage (%):
  Damage (%) for a maize plant leaves =[(total number of damaged leaves of single maize plant)/(Total number of leaves assessed per single maize plant)]*100

  NB: To assess the damage on maize cob and tassels: the severity index formula should be used to determine and quantifying the damage caused by the pest.

4. References:

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