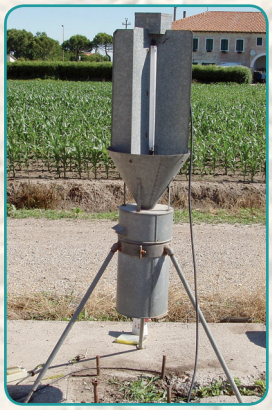
VENETO AGRICOLTURA
Azienda Regionale per i settori Agricolo, Forestale e Agro-Alimentare

REGIONE DEL VENETO

ANNUAL CROPS BULLETIN



The European Directive 128/2009/EC on the Sustainable Use of Pesticidese made it compulsory to apply IPM to all crops in the European Union since January 2014. Although IPM strategies are commonly used on plantations such as orchards and vineyards they have not been widely introduced for maize and other annual crops in Europe (Furlan and Kreutweizer, 2015). As arable farming often has limited resources in terms of income, labour and technology, a special effort is needed to ensure that the directive is successful. This means that if IPM is to be introduced for arable crops, there is a need for a) low-cost strategies; b) time-effective tools; and c) economically and environmentally sustainable pesticides or other pest control methods. One way to achieve these goals is to initiate a modern advisory system that can provide online information on crop treatment options and explain technical criteria. This has been demonstrated in Italy by the new *Bollettino delle Colture Erbacee* ("Annual Crops Bulletin") (http://www.venetoagricoltura.org/subindex.php?IDSX=120). This advisory bulletin is based on a low-cost **area-wide** pest and disease monitoring system that establishes when and where pest populations pose a potential economic risk to arable land. Where the risk occurs, it advises how to do a **local in-field evaluation**. The-wide monitoring is low-cost since it is based on: a) pheromone traps, which are user-friendly and inexpensive; b) pest population models using meteorological information (e.g. the Black Cutworm Monitoring and Forecasting program (Furlan *et al.* 2001) and the Davis model for Western Corn Rootworm egg hatching, Davis *et al.* 1996); c) spatial analysis based on GIS mapping (e.g. geostatistics, De Luigi *et al.* 2011); and d) agronomic information from a number of areas. In order to ensure that IPM can be applied to arable crops reliably and affordably, the monitoring and assessment must be conducted at both regional and local farm levels where needed. At the local farm level, the monitoring procedure requires on-the-ground scouting and/or samples to be taken when areas at risk of significant crop damage from a given insect are identified at regional levels (Furlan *et al.* 2013). Monitoring crop development may also reveal different susceptibility levels and therefore methods of intervention must be adjusted accordingly. Farmers and other practitioners are informed in a timely manner about these issues and trained in how to use the information correctly in a successful IPM plan where production costs are competitive and environmental impacts are limited.

ANNUAL CROPS

- Little manpower available
- General low technical knowledge
- Little tradition/experience of monitoring and IPM, unlike in orchards/vineyards

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- Low-cost strategies
- Time-saving tools
- Sustainable technical tools

TOOLS FOR AREA-WIDE MONITORING

- Network of traps (pheromone, sticky, etc.)
- Statistical evaluation methods to exploit monitoring information (e.g. Geostatistics)
- Agronomic information
- Meteorological information
- **Forecasting models** of pests, diseases, crops

CURRENT MAIN FORECASTING MODELS

- **WEED IPM:** ALERTINF EMERGENCE PATTERNS OF THE MAIN WEEDS (PADUA UNIVERSITY)
- **WCR IPM:** WCR EGG AND LARVAL DEVELOPMENT (DAVIS)
- **WCR IPM:** ADULT/FEMALE DEVELOPMENT PATTERNS (NOWATZKY)
- **BLACK CUTWORM ALERT PROGRAMME:** IOWA UNIVERSITY (ADAPTED TO ITALY)
- **ECB:** POPULATION DEVELOPMENT
- **CROPS:** CROP DEVELOPMENT PATTERNS (CROPSYST)
- **FUSARIUM CEREALS:** DISEASE PATTERNS

MAIN FEATURES OF THE BULLETIN

- **Flexibility:** published on average at least weekly, but varies with requirements, as closely related to crop and pest development. Information forwarded by email and available online (www.venetoagricoltura.org). Alerts also given by SMS for immediate risks
- **Advanced planning:** continuous information on how to react promptly and properly in case of alert messages
- **Training:** bulletins designed to provide in-depth information (e.g. recognition of symptoms, pests, pesticides, ...)
- **Participation:** farmers can use monitoring tools
- **Interaction:** chance to ask questions and to propose changes

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AN EXAMPLE

USE OF THE ANNUAL CROPS BULLETIN FOR IPM OF BLACK CUTWORM (BCW)

BACKGROUND - BCW FEATURES

- Occasional attacks (last major outbreaks 1971 and 1983);
- Low economic damage;
- Attacks not predictable at sowing;
- Negligible control by soil insecticides when needed (including seed coating);
- Alert programme predicts when and where post-emergence treatments are needed.

AREA-WIDE LEVEL

- Black cutworm alert programme: uses pheromone traps to establish areas where BCW moths have arrived, and evaluates southern winds (***participation and interaction:*** *farmers inspects traps and exchange data and observations).*
- Bulletin on population development based on the use of a development model to predict the formation of harmful instars (***Flexibility:*** *frequent issues in higher temperatures, as the moths develop faster;* ***Advanced planning:*** *1-2 months before formation of harmful instars, information is provided about moth distribution, and a request made for a record of fields with plants, since BCW larvae can only grow where they have something to feed on. The recorded fields alone will be scouted some months later, just after the harmful larvae have formed).*

COMPLEMENTARY LIMITED IN-FIELD EVALUATION

- Scouts sent to monitor at field level only where area-wide monitoring detected moth populations *(bulletin used for training)*;
- When harmful stage forms (fourth instar, DD accumulation) in an identified area, scouts sent to look for damaged plants;
- Possible foliar treatment when fourth instar forms, and scouts forecast an early attack above threshold (5% of plants damaged);
- Effective insecticides available.

SUMMARY: what the "Annual Crops Bulletin" offers to implement IPM of BCW

- General pest information;
- Area-wide monitoring information – area hit by damaging population;
- Egg-laying period – fields at risk during flying period;
- Development model – formation of the fourth instar;
- Trial results.

YEAR	FIRST CAPTURES	FIRST SIGNIFICANT FLIGHT	FLIGHT LEVEL	southern wind	4th INSTAR first larvae	peak of 4th instar larvae	Forecast date for 176 DD	DAMAGE LEVEL
1991	March 6	March 21-26	Medium	not available data	NO larvae found			very low
1992	April 1	April 3-6	low	17 - 22/3; 29/3-2/4	NO larvae found			NO DAMAGE
1993	March 29	April 6	low	13-20/3; 29/3-1/4	NO larvae found			NO DAMAGE
1994	March 4	Marchy 23 - 26	medium	2/3; 22 - 24/3	May 5	May 7-8	May 8-13	medium
1995	March 11	NO	very low	7/3; 27-28/3	NO larvae found			NO DAMAGE
1996	March 18	April 3	medium	5/3; 31/3	May 2	May 6-8	May 9-11	medium
1997	NO	NO	very low	20-22/3; 26-27/3; 30-31/3	NO larvae found			NO DAMAGE
1998	March 16	April 5-12	medium	13-18/3; 28/3-4/4	May 13	May 15-17	May 8-13	medium
1999	March 26	April 6	low	23-25/5; 3-4/4	May 10	May 14	May 5-10	low
2000	March 29	March 29 April 5	medium	20-23/3; 29-31/3	May 4	May 8	May 4-8	low
2001	March 2	March 17	medium	27/2; 15/3	April 29	May 1-2	May 5-9	medium

Results of the implementation of the Black Cutworm Alert programme in Veneto over a 11 year period (Furlan *et al.* 2001).

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