20 YEARS OF DIABROTICA IN EUROPE, PRESENT AND FUTURE CHALLENGES

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OUTLINE.....

-  Once upon a time........in early 1990’s
-  Multi-country cooperations, R&D projects
-  Present and future challanges?
Historical retrospect….

1992

Mid-July, near Belgrade Airport: Unusual maize destruction symptoms on a 0.5 ha field

Historical retrospect....

1994

WCR Spread: cc. 200 000 ha in Yugoslavia /Serbia

1995

1st International Meeting on *Diabrotica v. virgifera* LeConte, 20-21 March, Graz, Austria. (IWGO)

- Draft EU project concerning *D. virgifera*

Dr Baufeld (DE) explained that a proposal for a 3-year project on PRA and elaboration of

1995

2nd Int. Meeting on *Diabrotica virgifera virgifera* LeConte, 08 Nov., Gödöllö, Hungary (IWGO)
Historical retrospect....

1996
3rd Int. IWGO Workshop & 1st EPPO ad hoc Panel on *Diabrotica v. virgifera* LeConte, 16-17 Oct., Zagreb, Croatia.

1997
Historical retrospect....

1997

International cooperation initiated: FAO of the UN Technical Cooperation (TCP) Project. Partners: Bosnia-Herzegovina, Croatia, Hungary, Romania (Non-TCP Partners were invited and broad cooperation started in the region.)

Activities to:
- establish trapping programme and
- control and containment programme

Szeged, Hungary

Mures river valley, Romania
TCP Project of FAO of UN: 1997-1999

SLAM-based are wide management concept:
- application tests
- efficacy tests

INVITE-based are wide management concept:
- application and efficacy tests
TCP Project of FAO of UN: 1997-1999

Spread of Western Corn Rootworm in Europe from 1992-1997 (based on data from Barcic, Camprag, Ivesy, Maceli, Pimczinger).
Difficult situation in the region

- countries infested were not Members States of the EU;
- countries in a transition period (collapse of the former system)
- specific post-war situation in the Balkan;
- extremely weak capacity of farming communities to address the issue by WCR, missing/weak advisory systems, etc.
2000: First shocking field damage by WCR larvae in Hungary
Heroic period 1992 - 2000

Monitoring:
- learning tool
- frame for developing cooperation
- increasing experiences on WCR

Emergency measures:
- adult control by insecticides
- initial trials for larval control
2000-2003: The first multi-country R&D project funded by the EU on WCR ecology and Management in Europe

"Threat to European maize production by invasive quarantine pest, Western Corn Rootworm (Diabrotica virgifera virgifera): a new sustainable crop management approach".

(EU-5 QLK5-CT-1999-01110)

"Quality of Life and Management of Living Resources’ Key Action 5.

Rotation trial, 2001-2003, Hungary
Integrated Pest Management for Western Corn Rootworm (WCR) in Central and Eastern Europe

Signature of the regional project: 16 July 2003.
Donor: Government of Italy

Food and Agriculture Organization of the UN:
- Regional Office for Europe;
- Global IPM Facility, AGPP

Government Implementing Agencies: Ministr. in 7 countries in Central and Eastern Europe.
Overall development objective:

“Corn production in Central Europe protected from losses caused by WCR through the development and implementation of IPM strategies by farmers, based on sound understanding of local agro-ecosystems and protection of biodiversity as the main element of sustainability of agricultural production”
Thematic project areas

- Participatory Research & Training
- WCR Monitoring & IPM development
- Bio-diversity studies
- Socio-economic and policy studies
Developing participatory research and training with farmers

2001 – WCR monitoring with some farmers;
2002 – initial farmer groups on WCR, some exchanges between farmer groups;
2003 – Total of 32 FFS in 7 project countries;
2004 – Total of 90 FFS in 7 project countries;
Developing participatory research and training with farmers

Integrated Pest Management for corn: a necessity or an opportunity? The case of the Western Corn Rootworm
April, 19-20, 2006 Pordenone, Italy

Edited by Gianluca Governato
2006-2008: Diabr-Act EU 6th Framework Project

„Harmonising strategies to control Diabrotica virgifera virgifera”
Multi-country cooperations, R&D projects

WCR control and management, IPM of maize have often been linked to and were „satellite” topics of various research projects (e.g. Maize Case Study and Maize Based Cropping System of the ENDURE (2007-2010) EU funded project.
2000 - 2010

Generating knowledge in Europe on:

- biology and ecology of WCR
- thresholds to support decision making
- control tools to manage WCR
- socio-economic implications
- IPM development for WCR
- involvement of key stakeholders

Bilateral or national activities, scientific cooperations among scientists and institutions in EU, non-EU countries (USA, etc.), international associations.

Verification of WCR related data and adaptation of conclusions generated elsewhere to specific local conditions in Europe.
Accidental introduction of:

- *D. barberi* (with prolonged/extended diapause)?
  - may reach 13.9%-51.3% (Levine et al., 1992. J. Econ. Ent)

- *D. v. virgifera* (the rotation resistant variant)?

If yes,

- the probability of detection of these beetles?
- crop and farm management response by farmers?

(Source: C.R. Edwards, Purdue)
Present and future challenges, opportunities

Genetically modified *Diabrotica*-active Bt-maize events in the EU?

- Cry3Bb1 MON 863 and MON 88017;
- Cry34Ab1/Cry35Ab1 DAS-59122-7;
- mCry3A MIR604;

and

- pyramided Bt-maize expressing among others the:
  - Cry3Bb1 + Cry34Ab1/Cry35Ab1 or the
  - Cry34Ab1/Cry35Ab1 + mCry3A proteins;

and

- future developments… including hybrids with multiple traits

How the cultivation of hybrids containing these events (if approved in the EU) will impact maize cultivation practices and WCR management?
Flight/dispersal (gravid female)

Planetary “Mixing” Layer (up to ≈3-4 km)

above ground (≈8 m)

D.v.v.

Based on: C.R. Edwards, Purdue Univ. IN USA
Dilution of WCR population level (through adult dispersal)
A more complex picture for WCR adult dispersal….

Impact of all available control and management options, elements of IPM and of farming practices on WCR population level and on sustainability of farming?
WCR is a pest of maize BUT in a maize + maize cultivation system.

The frame of sustainable WCR management is a system approach (arable cropping and/or farming systems) in a broad spatio-temporal scale and adapted to regional/local conditions.

Great chance for policy makers to develope appropriate frame for IPM and peaceful coexsisistence with WCR.
Specific impact of the establishment of WCR in Hungary on various stakeholders
Specific impact of the establishment of WCR in Hungary on various stakeholders (artists, housewives, students, etc.)

Thank you for your attention