Opportunities for Utilising Biological Control in Organic Farming in Africa

Diamondback Moth (DBM), a pest for Brassicaes

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Biological control-The concept

Biological control in pest management simply describes a condition where other living organisms manage pests

The living organisms are collectively termed as “Natural enemies”

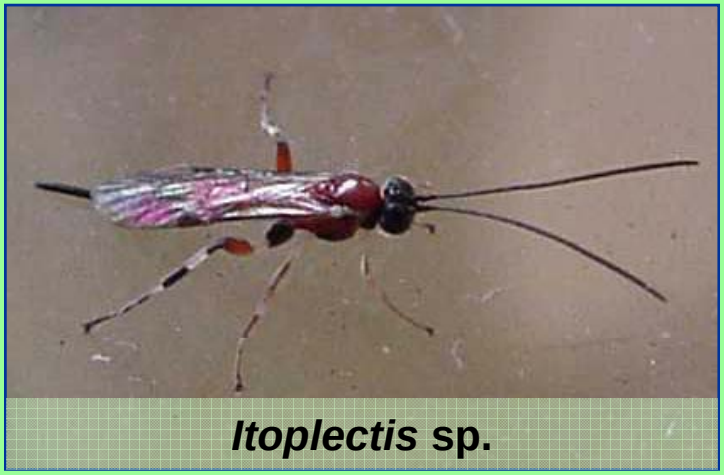
The natural enemies are free living organisms, which do not cause an injury to crops

Scientifically, natural enemies are categorised as; parasitoids, predators, or pathogens -based on the way they interact and kill the pest

Some natural enemies

Diadegma mollipla

Oomyzus sokolowskii



***Itoplectis* sp.**

Forms of biological control

- Classical biological control- importation of natural enemies
- Inoculative and indundactive biological control- using endemic (indigenous) natural enemies
- Enhancement of the environment to increase effectiveness of natural enemies

Back ground to Biological control in Africa

- Use of biological control dates way back in 1890's
- Focus was on control of exotic pests imported with introduced crops
- Successes and failures have been registered in several countries in Africa
- Many programmes focused on classical biological control
- Utilisation of endemic natural enemies is gaining importance

Some successes with biocontrol

Country	No of introductions and (successful controls)	No of pest species targeted	Year started
Mauritius	132 (10)	22	1913
South Africa	106 (11)	32	1892
Kenya	53 (6)	18	1911
Ghana	47 (2)	5	1948
Seychelles Islands	30 (6)	13	1930
Madagascar	28 (3)	11	1948
Cape Verde Islands	25 (2)	10	1981
Uganda	24 (3)	9	1934
Re'union	22 (4)	9	1953
Zambia	22 (2)	6	1968
St Helena	20 (4)	6	1896
Senegal	17 (1)	3	1954
Tanzania	17 (3)	8	1934
Comoros Islands	12 (0)	2	1969

Source: David J. Greathead , In Biological Control in IPM systems in Africa 2003, page 5, Eds Peter Neuenschwander, Christian Borgemeister and Jurgen Langewald

Some factors for success – Research level

- Highly developed capacity of “local” scientists to undertake research in agents of biological control
- Participatory research approaches with farmers in biocontrol programmes
- Increased collaboration of African scientists with researchers in the developed world
- Increased funding and time invested into research for the most effective NE before multiplication and releases
- Improved infrastructures of breeding sites
- Carefully designed pest and natural enemies population studies
- Policy support

Some factors for success at the farm level

- Farmer education
- Integration of farmers' indigenous knowledge with researcher's input
- Farmer involvement-rearing, releasing and monitoring and reporting
- Promotion of farming practices that conserve and enhance the survival and activities of natural enemies
- Promotion and use of selective and NE friendly pesticides-no pesticides

Challenges for utilisation of biological control

- Knowledge intensive- continuous research is needed
- Use of incompatible pest management approaches like indiscriminate use of pesticides
- Risks associated with introduction of biological control agents
- Introductions and releases that are done arbitrary- resource intensive
- Attitudes and perceptions among stakeholders that biological control is inadequate

Challenges con’t

- Biological control works with nature- many factors can antagonise the effectiveness of NE for both local and introduced NE species
- Unstable farming systems like annual cropping
- Threat from monocultures as pressure for specialised and increased production mounts
- Subsidised pesticides and other agrochemicals from agriculture productivity enhancement programmes funded by development agencies
- Biological control and input substitution

Opportunities in the organic farming system

- Organic farming practices enhance the survival of NEs. e.g. the mixed cropping system that is prevalent on a farm of a typical organic African small holder is conducive for the survival of NE
- Once an effective NE is identified, there is limited fear for attack of non targeted hosts
- Collaboration in terms of exchange of NEs from Africa and developed world and vice versa
- A diversity of NE species can be present and attack different life stages of hosts providing effective control

Way forward

- Renewed effort to survey and identify indigenous natural enemies is critical
- Continuous research to understand the biology and ecology of the different indigenous natural enemies for particular pests is critical
- Increased collaboration of African Research centers with (organic) research centers in the North in the field of biological control
- Technological innovations; to test what works well within our faming systems and utilise it, involving farmers (participatory)

A parasitoid attacking a caterpillar (pest)