Current IPM/IRM Programmes for *Helicoverpa armigera* in Pakistan

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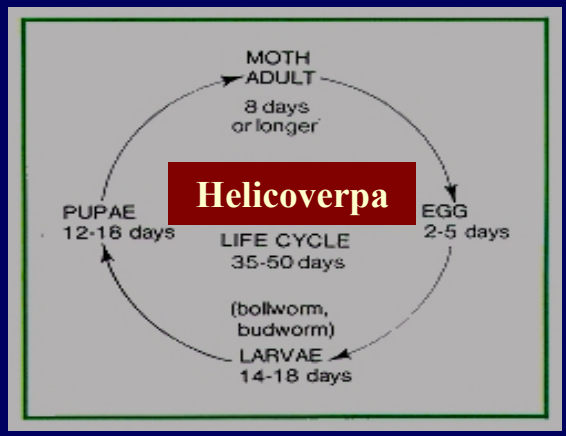
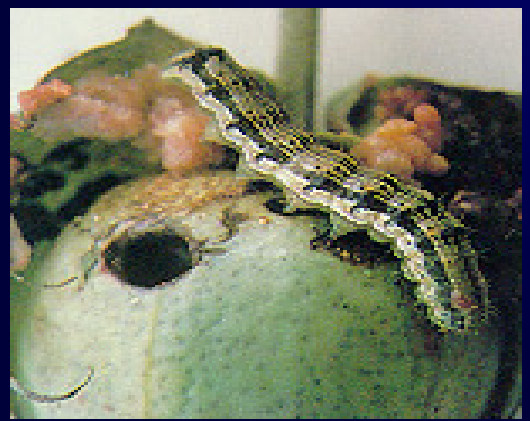
KEY PESTS OF COTTON IN PAKISTAN

COMMON NAMES	TECHNICAL NAMES
Thrip	*Thrips tabaci* Lind.
Jassid	*Amrasca devastans* (Distant)
Whitefly	*Bemisia tabaci* (Gennadius)
Aphid	*Aphis gossypii* Glov.
Two-spotted mite	*Tetranychus urticae* Koch.
Spotted bollworms	*Earias vittella* F.
	Earias insulana Boisd.
Pink bollworm	*Pectinophora gossypiella* (Saund.)
American bollworm	*Helicoverpa armigera* (Hübner)
Leafworm or Armyworm	*Spodoptera litura* (F.)
Beet armyworm	*Spodoptera exigua (*Hübner)

HELICOVERPA ARMIGERA

- **A key pest of cotton and other crops worldwide**
- **A sporadic pest of cotton in Pakistan, its outbreaks occurred in 1977, 1983, 1990, 1994, 1996, 1997, 1998**
- **A potential and great threat to cotton and other crops in Pakistan**
- **In Indo-Pakistan sub-continent it infests over 150 plant species of crops and weeds**


MOTH
ADULT
8 days
or longer
Helicoverpa
PUPAE
12-16 days
EGG
2-5 days
LIFE CYCLE
35-50 days
(bollworm,
budworm)
LARVAE
14-18 days



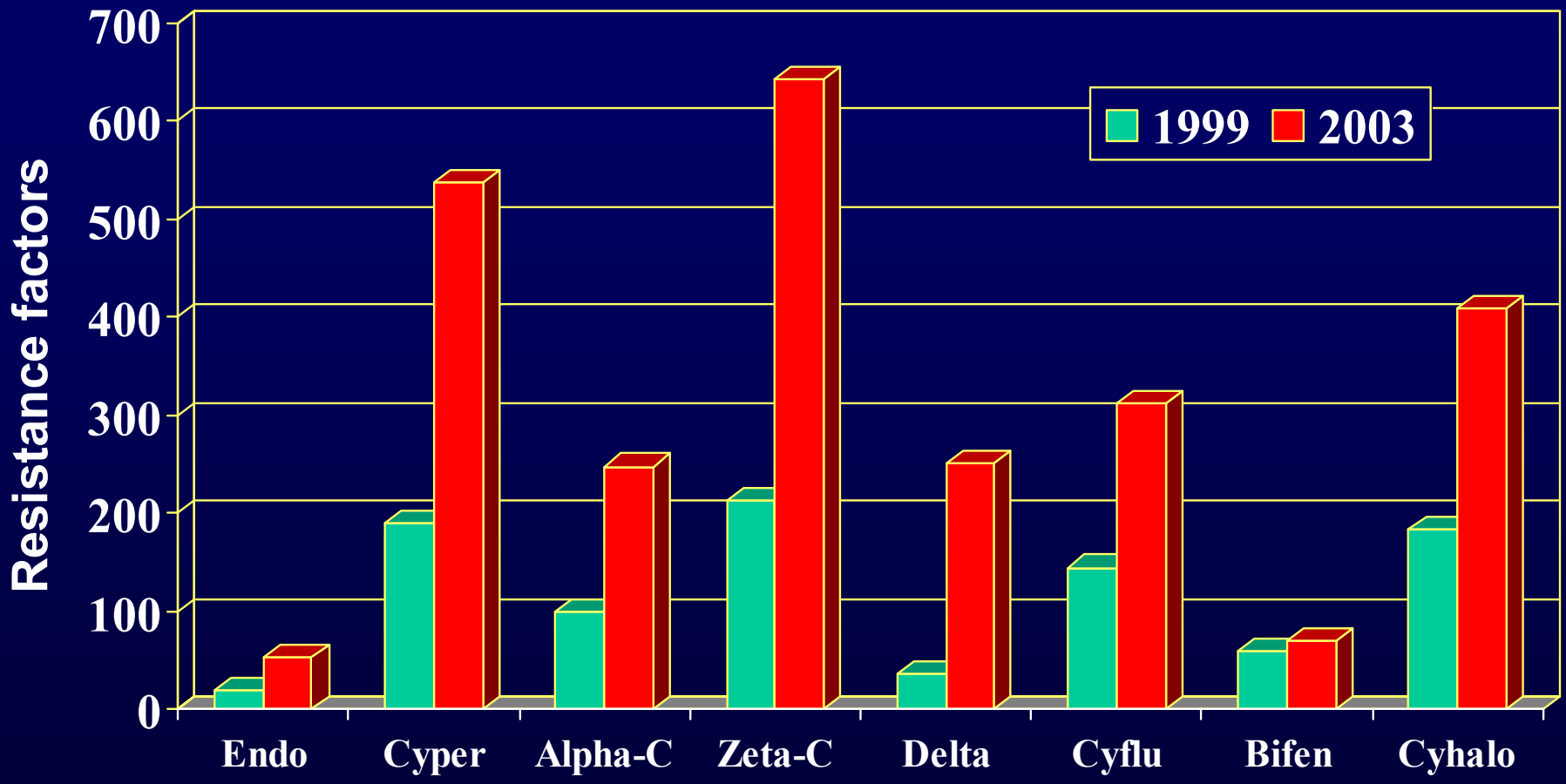
CONDITIONS WHICH FAVOUR *HELICOVERPA ARMIGERA* OUTBREAKS

- Over-whelming populations as a result of favourable environmental conditions such as periodic summer showers
- Destruction of beneficials by indiscriminate use of insecticides
- Poor control due to wrong insecticides, their low doses or their improper application

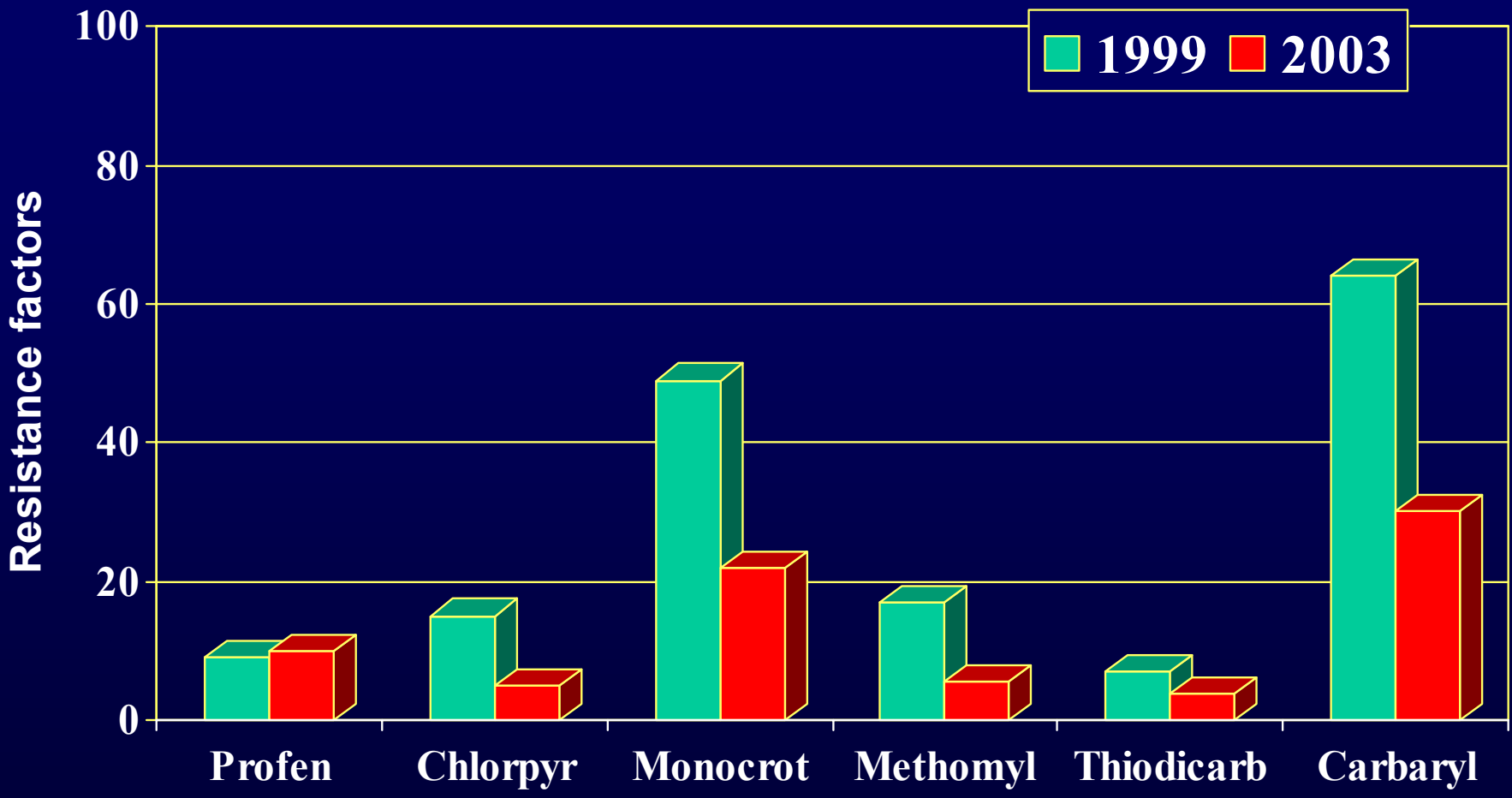
CONDITIONS WHICH FAVOUR *HELICOVERPA ARMIGERA* OUTBREAKS

- Development of insecticide resistance
- General improvement in cropping through the use of fertilizers, irrigation, etc.
- Changes in cropping practice such as no crop-free periods
- Monoculture of susceptible crops/varieties in large areas
- Close spacing of crops or varieties with broad leaves creating a dense canopy

RESISTANCE OF *HELICOVERPA ARMIGERA* TO ENDOSULFAN AND PYRETHROIDS



RESISTANCE OF *HELICOVERPA ARMIGERA* TO ORGANOPHOSPHATES AND CARBAMATES



MECHANISMS RESPONSIBLE FOR *HELICOVERPA* RESISTANCE

- **Reduced cuticular penetration**
- **Metabolic detoxification by monooxygenases and esterases**
- **Decreased nerve sensitivity**

Insecticide Resistance Management Strategy

General guidelines

- Scout crop at least once a week, or twice a week when pest pressures are high and environmental conditions favourable
- Spray only at economic threshold levels
- Follow recommended use rates, no under-dosing or over-dosing
- Direct insecticidal application at the insects habitat for improved coverage
- Delay the first spray on cotton as long as possible

Insecticide Resistance Management Strategy

General guidelines

- Do not apply insecticides to which resistance has developed. Replace such insecticides with those still effective
- Alternate insecticide classes with different modes of action to avoid development of insecticide resistance
- Don’t repeat the same insecticide class to which a control failure was noticed
- Don’t use any active ingredient more than twice per season

Insecticide Resistance Management Strategy

General guidelines

- No consecutive sprays of the same pesticide
- No mixtures if a single product can do the job
- Use larvicidal rates of pesticides only
- Avoid using broad-spectrum insecticides early in the season

Insecticide Resistance Management Strategy

Sucking insect pests

- Seed treatment or first spray with neonicotinoids like imidacloprid, thiamethoxam or acetamiprid
- Subsequent sprays with IGRs like buprofezin or pyriproxyfen, and diafenthiuron alternatively
- Broad-spectrum sprays of conventional insecticides towards middle or late season

Insecticide Resistance Management Strategy

Helicoverpa armigera

- Use novel chemistries like spinosad, indoxacarb, clorfenapyr, abamectin and emamectin benzoate preferably towards middle season
- Use conventional insecticides preferably towards late season

Spotted bollworms

- Use spinosad early in the season and pyrethroids late in the season

Pink bollworm

- Use sex pheromone gossyplure for mating disruption
- If gossyplure not used, apply pyrethroids

Thank you for your attention