PLANT PROTECTION CHALLENGES TO SUGARCANE

BY

(DR. M. Abdul Shakoor)
Senior Scientist (plant pathology)

SUGARCANE RESEARCH INSTITUTE,
FAISALABAD

Introduction & History of Red rot disease of Sugarcane

- First reported, by Went 1893 Java as Red smut.
- Tyron 1901, Queensland sever rotting, Barbers,1906 Madras India, poor drainage condition.
- 1906 Imperial mycologist Imperial Agri. Res. Inst. Bihar India named as Red rot
- Edgerton 1911 identified and studied in USA.
- Shephered 1926, Mauritius
- Khan *et al,* 1980 Ahmad *et al,* 1986 South Asian countries (Pakistan, Afghanistan Bangladesh & Neighbors)

Economic Impartance & losses

- Occurrence, all cane growing continent of world
- Singh and Lal(2000) mentioned wide spread 77 countries.
- In Thailand losses 34.6-73.7 in ratoon 100%(Pliansinchai *et al*,1992)
- Indo-pak many epidemics.
- Losses in cane juice quality, crystallization of sugar purity and recoverable sugar contents. Sugar quality and molasses affected.(Cellulase, Hydrolytic enzymes, pectin methyl esterase PME, anthroquinnone)-

Red rot disease Pathogen

- It is fungal disease (*Colletotrichum falcatum*)
- It is facultative saprophyte
- It attacks on a wide variety of plants, like mango, banana, chillies.
- Most wide spread, widely recognized, attested by economic importance.
- Most destructive in subcontinent. USA, Hwaii, Brazil, Mauritius, Thailand, Myanmar, Nepal Vietnam, Malaysia, South Africa etc.
- It is known as CANCER of sugarcane.
- Survives in forms of Chlamydospres, conidia, appressoria, acervuli
- Plant disease debris. Can bits, stubbles,Thick walled mycelium.
- Dead organic matter in soil
- Insects pests and optimum weather condition
- Mechinical injury during cultural/ agronomic practices.

Favorable environmental condition

- Mean temperature range of 26 to 31°C is optimum for the development of the disease
- pH 5-6 • Drought conditions during the initial growth phase
- High atmospheric humidity (90%).
- Water-logged conditions of the soil.
- Lack of cultural practices that result in the growth of weeds.
- Continuous cultivation of same variety in the field.
- Presence of susceptible varieties in the surroundings
- Poor drainage /little percolation of water

Symptoms On young Crop

- Pre- germination death of buds.
- Drying of initial/ primary shoots
- Infection of pathogen causes orange Yellow Discoloration of leaves in tillering Stage.
- Leaves in whorls dark reddish lesions on mid-rib
- Intensity in field, favourable weather condition,Drainage of soil, cultural practices, Variety, Fresh or Ratoon crop.
- Borers, and mechanical damages.

Symptoms of red rot disease

- Third leaf from top portion starts drying
- Elongated lesion on mi-rib, infection brown spots,
- Discoloration of cane to light brown or grey color
- Shriveling of canes, rind discoloration
- Gradually death/ sprouting of side tillers.
- In sever cases whole of the field became dry.
- Splitting cane /internal tissues, serial spots. band of white spot at the right angles to long axis of stalk.
- Varieties show discoloration, dull red to brown

Initial symptoms

Lesions on midrib of leaf

Red rot disease of sugarcane

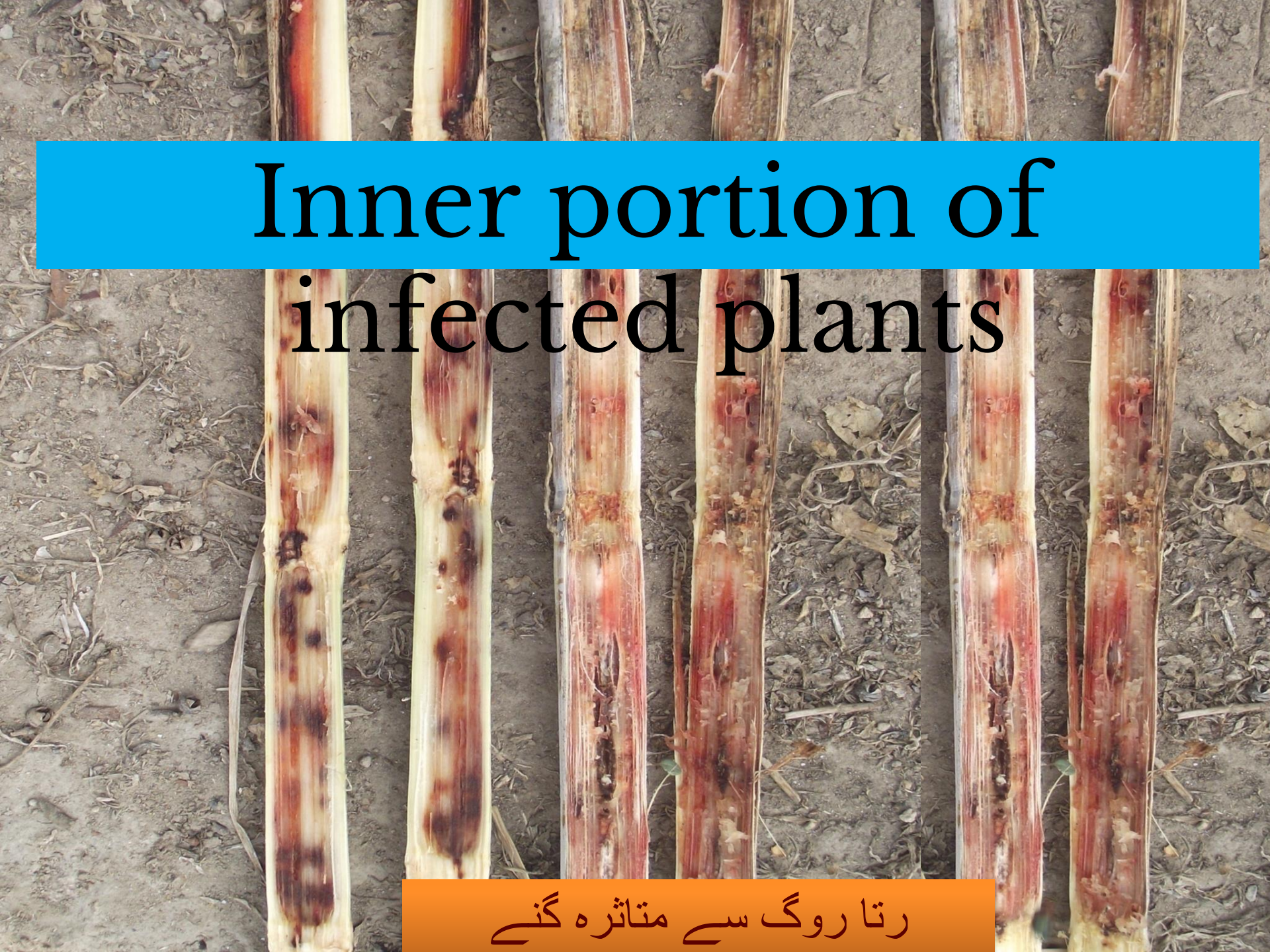
(رتاروگ کی ابتدائی علامات)پتوں کا خشک ہونا

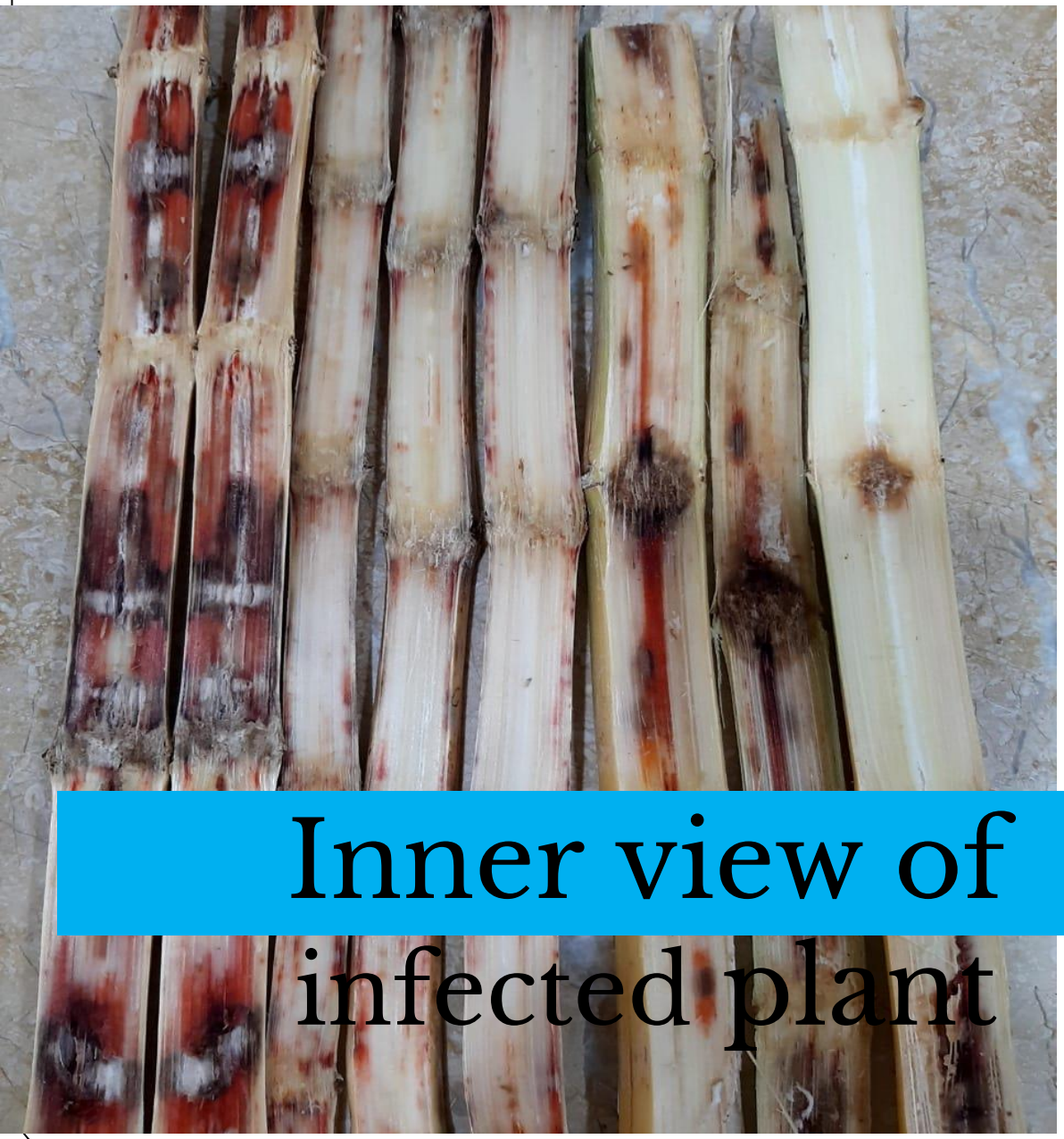

Grey to Dark brown spots
(field)
(ابتدائی علامات)کالے دھبے

Severely effected field

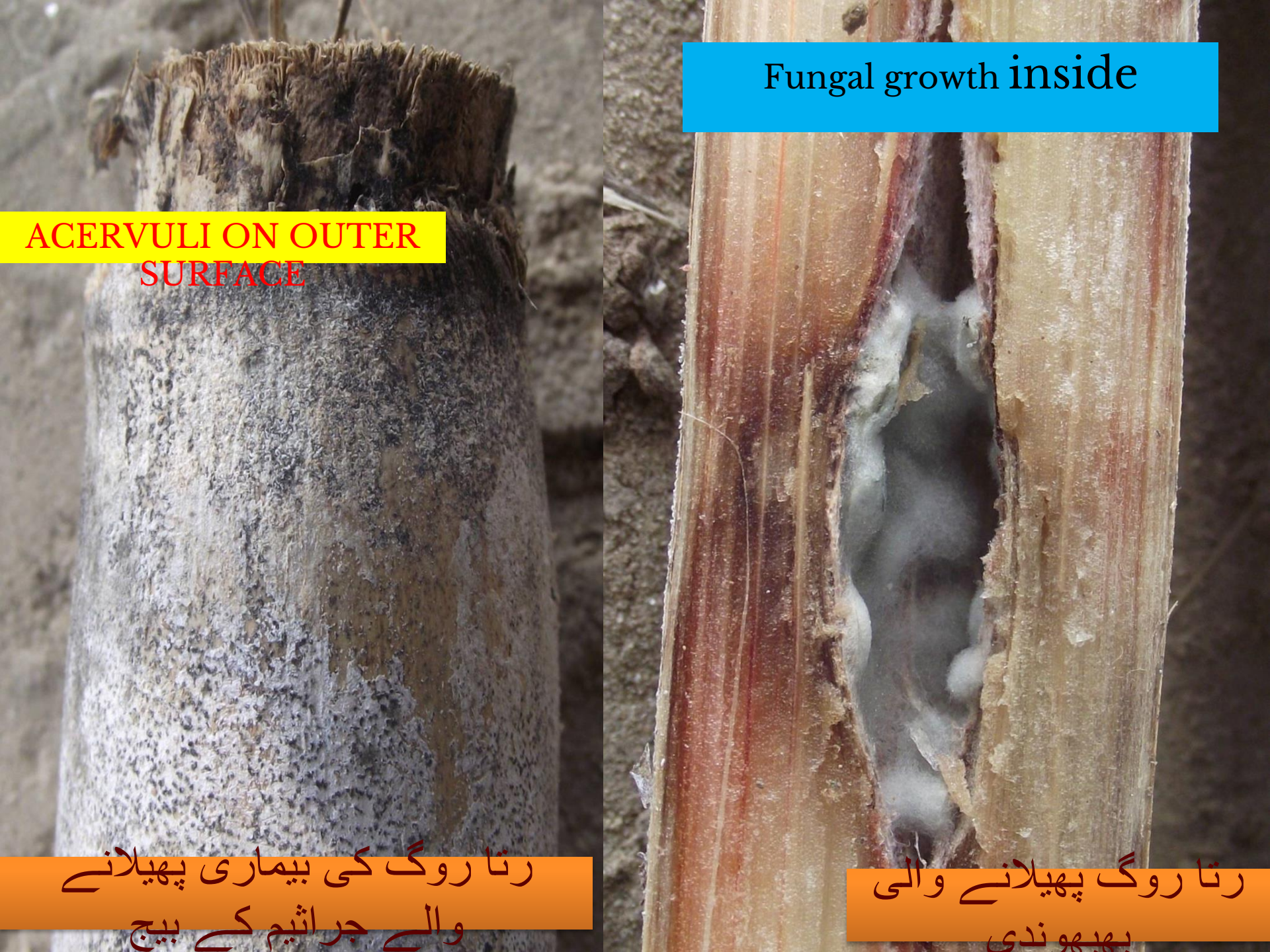
گنوں کاسوکھ جانا

Splitting of diseased cane


Inner portion of infected plants
رتا روگ سے متاثرہ گنے



Inner view of infected plant


ACERVULI ON OUTER SURFACE
Fungal growth inside
رتا روگ کی بیماری پھیلانے والے جراثیم کے بیج
رتا روگ پھیلانے والی پھپھوندی


Sugarcane

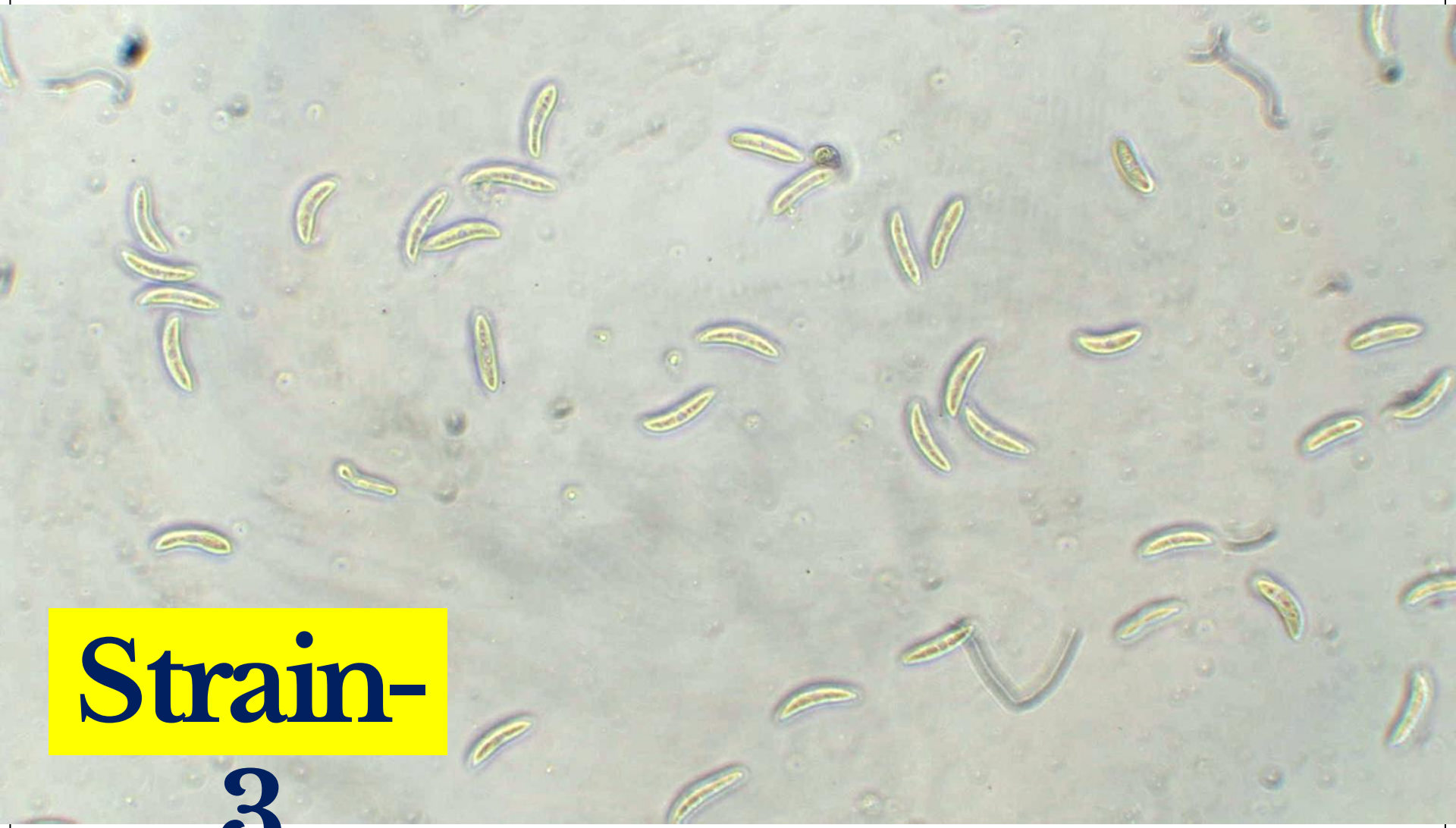
Origin of new strains

- *Colletotrichum falcatum* is an Facultative saprophyte, it has the ability to survive on dead organic matter, plant debris, stubbles also when host is absent.
- Adaptation of new type of cytoplasm, new toxic material, virulance/ aggressiveness is change.
- Origion of new strain is due to mutation, Hybradization and heterokaryosis.

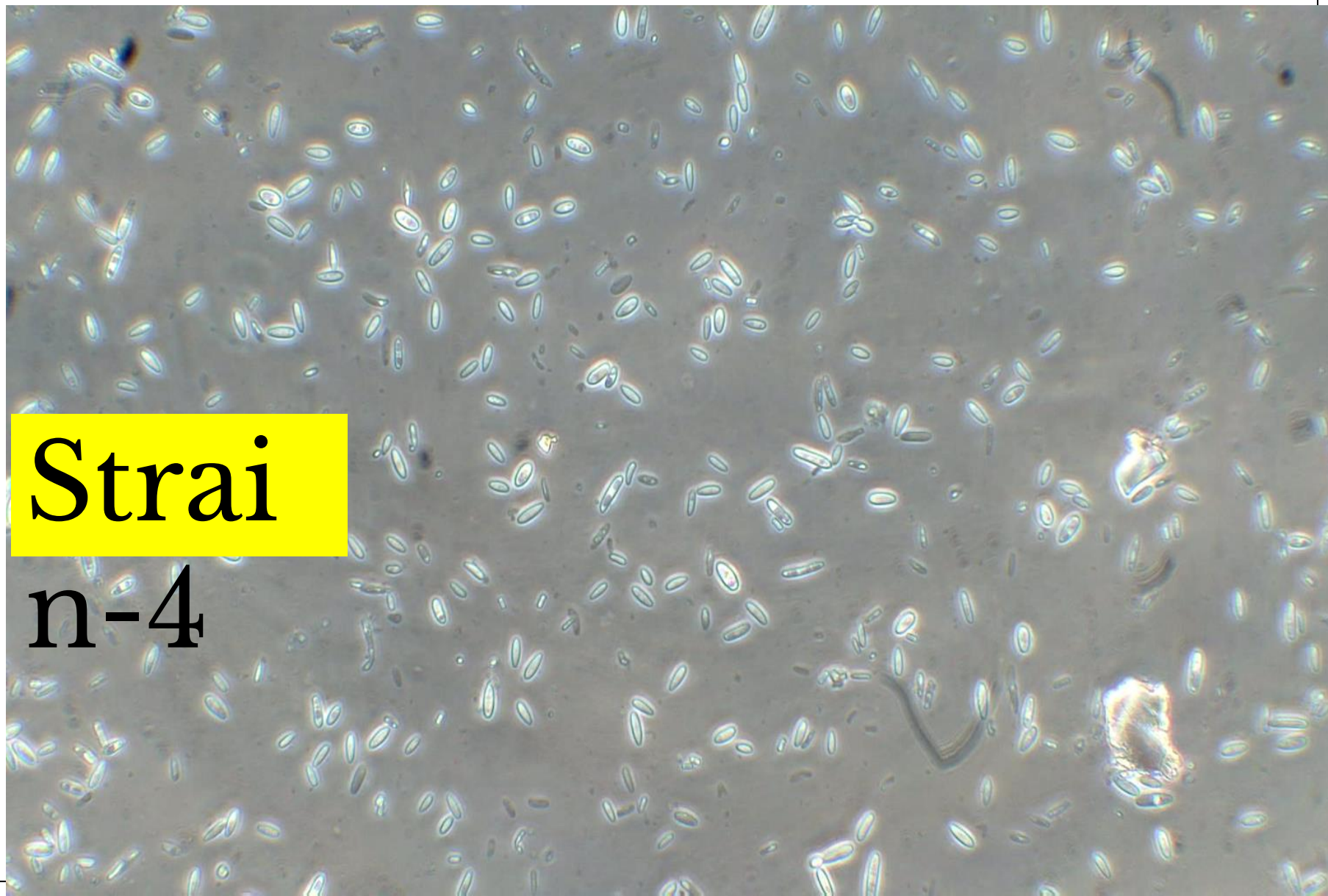

Red rot
strain-1

Red rot

strain-2



Strain-3


Strai
n-4

Control measures

- Use of healthy setts from healthy crop.
- Disinfection of cutting tools and hands of workers with surfactants or any detergent e.g. spirit, Dettol, washing powder, soap etc.
- Dipping of setts for 30 min. in carbendazim @2.5 gm / lit of water.
- Removal of infected tools and burning measures can be taken.
- Healthy field should not be irrigated from infected one
- Proper crop sanitation, crop rotation and discouraging of ratoon crop.
- Use of approved and Resistant varieties e. g. CPF-250, CPF-251, CPF-252, CPF-253. CPF77-400

- Hot water treatment, alone or in combination with carbendazim 0.1% most effective. Benlate, bavistin, thiophenate methyl. 30 minutes.
- Thiophenate methyl 0.05% salycilic acid soil borne diseases.
- Proper crop rotation with non-host crop or left the soil fallow in hot sunny days.
- Proper drainage of soil having sugarcane crop, water irrigation from sick field to healthy one.
- Planting of more than one resistant varieties.
- In standing crop drenching carbedazim and thiophenate methyl during premonson seasn.
- Self seed multiplication in close supervison.

Insect pests of sugarcane crop

- Early Shoot borer
- Root borer
- Stem borer
- Top borer
- Gurdauspur borer
- Pyrella
- White fly
- Mites and Bugs


Top shoot dried
Attack of early shoot borer (Feb.

hole due to early shoot bore

Eggs of early Shoot borer

Early shoot borer (5)


Stem bore


Top borer


Root borer

Gurdaspur borer


White mites

Pyrilla

nymph

Adult (بالغ

Red mites (affected


Red mites


White mites

Control measures

- Destruction of plant debris,and.
- Heavily infested crop should not be further propagated for next season.
- Discourage ratoon crop.
- Weeds free field.
- Proper crop rotation, non host crop.
- Well balanced fertilizers application
- Insect infestation free sett.
- Trichogramma and Chrysoperla cards.
- Predators and parasites (useful insects)
- Fipronil and chloropyrifos flooding