

Controlling of leaf curl complex:

- * Plant at correct time
- * Field sanitation.
- * Avoid mix cropping with other solanacea crops.
- * Select correct land for chilli cultivation.
- * Destroy crop residuals before starting new cultivation.
- * Use good quality seeds.
- * Select vigorous seedlings for transplanting.
- * Start nursery at the beginning of March and transport the seedlings at the beginning of April during kala season.
- * Avoid application of excess "N" fertilizer.
- * Control weeds.
- * Better to use sprinkler irrigation system during kala season.
- * Apply recommended insecticides due to 10-14 days interval.

Ex : Imidacloprid

Pipronil

Phothiophos

Carbosulfan

Little Leaf Diseases

- * Common in dry zone area during kala season.

Symptoms

- * At the initial stage leaves turn into yellow colour.
- * Then veins turn into dark green colour and other area turn into light green colour.
- * Then leaves become small and curve.
- * Produce more axillary buds with short inter-nodes stunted plants.
- * This disorder most probably due to deficiency.
- * Apply more organic fertilizer.

Pest And Diseases in Rice 😊

Pest

Rice Thrips - (Stenchaetothrips biformis)

- * Thrips attack can be seen at early stage (1-3 weeks).
- * Serious pest during dry period.
- * Late planted crops are more susceptible and short duration varieties has heavy yield loss.

Nature of Damage

Date:

No.

- * Damages leaves has silver streaks and yellowish patches .
- * Leaves curled from the margin to the middle .
- * Leaf tip wither off when severely infected .
- * Unfilled grains at panicle stage .
- * Under heavy infection seedlings turn into yellow .
- * Colour and dry out becoming into straw colour .

Control

- * Submerge infected field immediately for 1-2 days .
- * Drag a wet rope on the seedling .
- * Apply recommended insecticides .
- * Seed treatment with insecticides .

ex: carbosulfan .

Imidacloprid .

(2) Rice Gall Midge (*Gorscha oryzae*) Dipthera

- * Damage is high in wet humid area .
- * Infection is high in dry and intermediate zone in "Maha" season and wet zone during "Kala" season .

Nature of Damage

- * Formation of hollow cavity of tubular gall at the base of the infected tillers .
- * The gall formed is a silvery white colour .
- * Affected tillers inhibits growth of leaves and fail to produce panicles .
- * Leaves becomes deformed wilted and elongated the leaf sheath .
- * Also call onion leaf or silver shoots .

Control

- * Use granular insecticides . ex: diazinon .
- * Use resistant varieties .

(3) Brown plant Hopper (*Nilaparvata lugens*)

- * They lay eggs on midrib of the leaf or leaf sheath .
- * Eggs are white .
- * Nymphs white to brown .
- * Adult is brown .
- * They feed meant to the base of tillers .

Nature of Damage

- * They suck cell sap from lower part of the stem causing yellowing, browning and dry of plant.
- * Usually call as hopper burn.
- * In addition hopper vector in ragged stunt or grassy stunt virus disease.
- * In addition sooty mould can be seen at the basal area of the plant.

Control

- * Cultivate resistant varieties.
 - * BG 2/379, BG 807, BG 360, BG 300, BG 381
 - * (Moderately resistant) BG 403, BG 358.
- * Spray recommended insecticides at the early stage of infection.

(+) White Back Plant Hopper (C. sagotella fureifera)

- * Nymphs and adults feed on base of the rice plant and the leaf surface.
- * The attacked plants turn into yellow colour.
- * Later turn into rust-red appearance spreading from leaf tips to the rest of the plant.
- * When they attack at panicle initiation stage, the number of grains, the panicle length will decrease.
- * When they attack at the maturation stage grains don't fill fully and ripening is delayed.

Control

- * Similar to brown plant hopper (but indiscriminate)
- * Use of insecticide during vegetative stage known to cause BPH or breaks.

(5) Green Leaf Hopper (Nephotettix virescens)

- * Both nymphs and adults feed on leaves.
- * It causes to stunted plants and reduce their vigour.
- * Reduce no: of productive tillers.
- * Withering or complete drying of affected plants.
- * Vector in tungo virus disease.

Control

- * Use resistant varieties.
 - * BG 403, BG 300
 - * BG 357, BG 2/379

- * Better water Mgt.
- * Spray recommended insecticides.
 - ex: Imidacloprid
 - Thiamethoxam

⑥ 219 209 leaf Hopper (*C. Rescilia dorsalis*) .

- * They lay eggs on leaf sheath.
- * Yellowish brown nymphs and adult feed on leaves.
- * Feeding damage causes orange colour and leaf margin curl and turn into orange colour.
- * In addition they transmit tungo and orange leaf virus.

Control .

- * Spray recommended insecticide .

⑦ Rice leaf folder (*Champhalocrocius medinalis*)

- * Adult is a moth .
- * Larvae is a caterpillar .
- * They feed on leaves by folding a rice leaf around themselves and attach to the leaf margin ..
- * Usually they feed inside the folder and leaves . Creating longitudinal white and transparent streaks on the leaf blade .
- * Heavy infected fields appear scorched with many folder leaf .

Control .

- * Remove weeds .
- * Use resistant varieties .
- * Avoid rattoning .
- * Maintain proper density .
- * Flood the paddy field just after harvesting .
- * Apply balanced fertilizer mixture .

⑧ Rice case worm (*Nymphula dempenstis*) .

- * Female insects are moths .
- * They cut leaf tips to make leaf case .
- * Their feeding damage is cut leaves at right angles as with a pair of sciss.^{ss}

- * Cut leaf cases drop on to the water.
- * Usually papery appearance on leaves due to "remaining" of upper epidermis.

Control

- * Use correct fertilizer mixture.
- * Use wider spacing.
- * Transplant older seedlings.
- * Spray recommended insecticides.

Ex : Nova Turron
Chlorfluazuron
Azadirachtin

④ Stem Borer

- * There are 06 species of stem borer in paddy cultivation.

- ① Yellow stem borer.
- ② White stem borer (sesamia non ference).
- ③ Striped stem borer (chilo suppressalis).
- ④ Pink stem borer.
- ⑤ South American white stem borer.
- ⑥ Dark headed striped stem borer.

- * Stem borers can destroy the rice at any stage from
- * when they feed on tillering stage
- * It causes to "death heart".
- * Result is dry of the central tillers.
- * when they feed on rice plant at re-productive stage it causes to "white head".
- * Death heart or death tillers can be easily pull-out due to vegetative stage.
- * white heads at reproductive stage merging panicles are white colour with empty or unfilled grain.
- * Tiny holes can be seen on stems or tillers.

Control

- * Usually female insects lay eggs on leaf tips.
- * Therefore when seedlings are transplanting cut-off the leaf tips to reduce carry-over of eggs from nursery to the field.
- * Harvest crop at ground level to remove the larva in stubble (గొంగలు).
- * After harvesting plough and flood the land.
- * Spray recommended insecticides. ex : Carbaryl, Trebon.

⑩ Paddy Bug

Cleptocoris australicus

Date:

- * Usually Paddy bugs damage to the rice plant by sucking out the content of developing grains from free flowering spikelets to soft door stage.
- * Causing empty or unfilled grains.
- * And also affected grains get discolouration.

Nature of damage

- * Both nymphs and adult feed on immature grains causing:
 - Small or shriveled grains (ಕಡು ಹಣಿಗಳು)
 - De-formed or spotty grains (ಪ್ರಯಾಮಿ ಹಣಿಗಳು)
 - Empty or unfilled grains.
- * Usually , affected panicles are irrect.
- * Eggs are oval shape reddish brown in colour and shiny appearance can be seen along the midrib of leaf.
- * Nymphs are brown to green in colour.
- * Adults are brown in colour.
- * They have openive smell.

Control

- * Remove weeds in the field and surrounding area to prevent multiplication of rice bug during fallow period (ಹಬ್ಬ ಮಬೆ)
- * Spray recommended insecticides.
 - ex: carbosulfan
 - Diazinon
 - Thioglam

⑪ Hole cricket (Orthoptera) (Gryllotalpa orientalis)

- * Feed on tillers in mature plants and root system of rice plant.
- * Usually they can cut the plants at the base level.
- * It may causes to:
 - Loss of plant stand.
 - Poor growth of seedlings.
 - Damage root system.
 - Death seedlings.

Control

- * Maintain standing water - ಉಳಿ ಕೆತ್ತಲು.
- * Use insect baits.
- Usually this bait is made by mixing moistured rice bran and insecticide . Then keep along bunds or dry areas of the field.

(12) Rice Hispa [Coleoptera] C. Diclahispa armigera

- * Rice hispa scrapes the upper surface of the leaf blade.
- * Leaving only the lower evidence.
- * Under heavy attack it seems to be hopper burn.

(13) Rice Skipper [Lepidoptera] ഓരോല ശിപ്പർ

- * Feed on leaf tissues.
- * Usually they roll leaves and make a protected chain or border.
- * and eat the leaf tissues leaving only midrib of the leaf.

Other Pests

- Rats.
- Birds.

Diseases

Fungal Diseases

(1) Rice Blast [Magnaporthe grisea] Cercosporella

Symptoms

- * It may affect seedlings, leaves, panicle and other aerial part of the plant.
- * Some times it is known as leaf blast, node blast, panicle blast or neck rat blast.

Favorable Condition

- * High night humidity and low temperature increase the disease condition.
- * Therefore mostly happen in upland area.
- * It can be transmitted by seeds, straw or crop residues and weeds.

Symptoms

- * Leaf spots can be seen in brownish or reddish brown colour.
- * When nodes are infected spot become into black colour and rotten.
- * When it is infect in panicle area, neck of the panicle rotten.
- * It causes to fall off the panicle.
- * Under heavy infection secondary branches of panicle and grains are also affected.

Control .

- * Use of resistant variety .
- * Avoid application of high dose of "N" fertilizer .
- * Adjustment of planting time to avoid blast favorable weather condition .
- * Spray suitable fungicide .

ex: Benomyl
Carbedazim
Tebuconazole .

② Sheath Blight *C. Rhizoctonia solani* (Cossat 1902)

(*Thanatephorus cucumeris*)

Symptoms .

- * Spots or lesions 1st develop near to the water level or soil .
- * This spots initial appear on the leaf sheath .
- * Then it may spread on to the leaf blade .
- * These spots are usually irregular .
- * Lesions are greenish white in the center with brown margin .
- * At later stage disease can be spread to the flag leaf and it may affect on panicle exertion .

Favorable conditions .

- * Comparatively infection is high in low land rice cultivation .
- * It can be spread by crop residuals , weeds and soil water .
- * High plant density and use of high dose of "N" fertilizer increase the disease development .

Control .

- * Plough the very infected plant residues in to the soil .
- * Use of recommended seed rate .
- * Use weeds free field (field sanitation) .
- * ^{Avoid} Use excessive use of "N" fertilizer .
- * Spray fungicides .

ex: Tebuconazole .

Heraconazole .

③ Brown spot (*Bipolaris oryzae*) (Bipolaris oryzae)

Symptoms .

- * Brown colour spots on leaf blade , panicle and spikelets .
- * At seedling stage small circular yellow to brown .
- * Spot and at tillering stage small circular dark brown to purple brown spots on leaves .

Date: _____

- * Later these spots turn into light brown to gray center with reddish brown margin.
- * When it is infected to the seeds, unfilled grains and spotted or discoloured seeds are formed.

Favorable condition :

- * Unfavorable soil with poor drainage.

Control :

- * Use resistant variety.
- * Improve soil condition.
- * Apply balanced fertilizer mixture.

④ False smut - ଗୁମ୍ବାର ପତାଳ (Ustilaginoides viens)

Symptoms :

- * In infected plants individual rice grain transform into a mass of spore balls.
- * These spore-balls are initially orange in colour.
- * Then turn into greenish black colour.
- * In most cases not all spikelets of a panicle are affected.

⑤ Leaf scald - ଲେନ୍ ପାଦାର (Microdochum oryzae)

Symptoms :

- * It develops faster in wounded leaves than un wounded leaves.

Favorable :

- * wet weather and high dose of "N" fertilizer.
- * Source of infections are seeds and crop stubbles.
- * Light tan and dark brown lesions on leaf tips and edges.
- * Then these lesions spread to the other parts.
- * Then light brown fallows in mature leaves.
- * The affected area of leaves dry out giving the leaf scalded appearance.

Control :

- * Use resistant variety.
- * Avoid use of high "N" fertilizer.
- * Remove infected stubbles or ratbars.

Date _____ No. _____

* Spray fungicides

ex : Benomil

Carbendazim

Mancozeb

* Seed treatment with fungicides

ex : Benomel

Thiophanate Methyl

Carbendazim

⑥ Stem Rot - ഏരി മുള്ള് (Magnaporthe graminicola)

Symptoms

- * At the begining black lesions on the outer leaf sheath near to the water level.
- * The lesions are expanded and leaf sheath get rotten.
- * It causes to crop loggin.
- * Severe infection causes to tiller death.

Control

- * Burn straw and stubble or any crop residuals after harvesting.
- * Balance use of fertilizer.
- * Drain the field to reduce Sclerotia (ശ്രോട്ടാ)
- * Spray Fungicide at initial stage.
Ex : Thiophanate Methyl, topin.

⑦ Serocladium oryzae

Favorable condition

- * Stem borer, mite attack and high plant density.
- * The disease start from upper most leaf causes to young panicle.
- * The leaf spots dark red or brown margins with gray colour center.
- * Causing rotting of the leaf sheath.
- * This disease condition reduces the grain yield by aborting the panicle emergence and producing un filled grain and sterel panicles.
- * Sheath rot also reduces the grain quality.
- * BC₂ grains becomes into dis-coloured.

Control

- * Use disease free seeds
- * Minimize insect damages
- * Maintain field sanitation
- * Use correct spacing
- * Seed treatment with "carbendazem"
- * Spray "Mancozeb" at booting stage

Grain spotting and pecky rice

- * Grains dis-coloured by fungal infection or insect damage.
- * Commonly called as pecky rice.
- * This is a complex disorder in rice.
- * That involves many fungi, white tip nematodes and insect damages.
- * And also high winds at the early heading stage may cause similar symptoms.
- * Proper insect control and disease mgt will reduce this condition.

Bacterial Diseases

① Bacterial Blight (Xanthomonas oryzae)

- * Bacterial blight causes to yellowing and drying of leaves and seedling wilt.
- * When it is affect on seedlings leaves turn into yellowish green and roll up.
- * Finally seedlings dry up and die.

Control

- * Use balance fertilizer mixture.
- * Ensure better drainage in the field and nursery.
- * Allow to follow the far a-3 season.

② Bacterial Leaf Streak (Xanthomonas oryzae)

- * Infected plant shows browning and drying of leaves.
- * It affect on photosynthetic.
- * Therefore under heavy infection it leads to reduce grain weight, result in low yield.
- * Favorable conditions are high temperature and high humidity.
- * Disease can be transmitted by seeds and infected stubber to the next planting season.

Control

- * Use resistant variety.
- * Treat the seed with hot water before planting.
- * Field sanitized.
- * Use balance fertilizer mixture.
- * Avoid application high dose of "N" fertilizer.

② Bacterial sheath Brown Rot (*Pseudomonas fuscovagilae*)

- * This is a seed born disease.
- * It causes rotting of leaf sheath, seedlings and mature plants.
- * First symptom appear on discolouration of leaf sheath.
- * Usually on the flag leaf sheath and on the panicle.
- * Under heavy infection entire leaf sheath may become necrotic and infected panicle will dry out.
- * Therefore grains of infected panicle are:
 - Discoloured.
 - Deform or empty.

Control

- * Clean the field immediately after harvesting.
- * Use disease free seeds.
- * Use 20-30 days old seedlings for transplanting.
- * Treat seeds with hot water (60-65%).

Viral Diseases

① Rice grass stunt (কান্দি গুড়া)

- * This disease reduce yield by inhibiting the panicle production.
- * Plants can be infected at any growing stage.
- * Infection is high during tillering stage.
- * The common vectors are plant hoppers.

Symptoms

- * Excessive tillering - বেলের
- * Severely stunted plants.
- * Grassy and rosette appearance.
- * Yellowish green shorter and narrow.
- * Mottled appearance on leaves.
- * Infected plants fail to produce panicle.

Control

- * Control vector (brown plant hopper)
- * Use BPH resistant variety

② Rice Ragged stunt - (ରାଜ୍‌ବାଦ ରାଗ୍‌ପଣ୍ଡିତ)

- * It may directly affect on final yield cause in partially exerted panicles and unfilled grain.
- * The vector is BPH

Symptoms

- * Severe stunting during early stage.
- * Leaves with serrated un even edges.
- * Leaves appear yellow brown and twisted in to spiral shapes at the base of leaf blade.
- * Flag leaf is twisted and malformed.
- * Delay flowering and any complete panicle.

Control

- * Use resistant variety
- * Control vector (BPH)

③ Rice Yellow Mottle virus

3.

Symptoms

- * Appear as yellow green along leaf blade.
- * Yellow green spots on the base of the youngest leaves.
- * Infected leaves twisted and mottled.
- * Severely infected plants are stunted, low tillering ability and sterile spikelets but not reported in SL.

④ Tungrow

Symptoms

- * It causes to leaf discolouration, stunted growth reduce tiller numbers and sterile or partially filled grains.
- * The most efficient vector is green leaf hopper.
- * Disease can be infected at any growing stage.
- * But it is most frequently seen during the vegetative phase.

Control

- * Use resistant variety to green leaf hopper and control vector.