

Planting Instructions for Bollgard II® & Bollworm Management Bollgard II cotton hybrids produce two Bt proteins, Cry1Ac and Cry2Ab, which together manage the key lepidopteran pests of cotton in US American bollworm, Spotted bollworm, Pink bollworm and the Tobacco caterpillar. As per the Gazette notification 5,0,4215 (E) dated December 27, 2016, by Ministry of Agriculture and Farmer's welfare, Department of Agriculture, Cooperation and Farmer's welfare, Government of India, the seeds in this packet are mixed with 5% Non-Refuge. This technology does not provide control of sucking insect pests of cotton. Refugia-in-Bag (RIB) concept for insect resistance management: Blending 5% of non Bt seeds in Bt cotton seed packet is called Refugia in Bag (RIB) concept. Non Bt hybrid possesses similar duration and fiber properties as that of Bt hybrid. Minimal yield loss is expected due to mixing of non Bt seeds, however RIB helps in delay of insect developing resistance to Bt and enhances the durability of technology. The following general guidelines can help to get maximum benefits from Bollgard II cultivation Land Preparation: Remove and burn debris of previous crop for field sanitation. Give two deep summer ploughings to reduce soil borne diseases, insects and weeds. Prepare the field by repeated harrowing to bring the soil to suitable tilth. Manures and Fertilizers: As per 5 to 6 tonnes farm yard manure 3 to 4 weeks before sowing Fertilizers. Apply fertilizers as per the soil test report and local recommended practices Spacing: Spacing requirements should be adopted as per local recommended practices. Sowing method: Sow 2 seeds/hill for maintaining proper population. After germination, leave one vigorous plant per hill and remove the weak plant. Gap filling: To achieve optimum plant stand, if necessary gap for gap filling within a week period.Inter-Cultivation and weed control: Follow need based hand weeding and inter cultivation practices to check the growth of the weeds. It helps in better soil aeration and soil moisture conservation. Follow recommended herbicide application, if it is in practice. Irrigation: Ensure moisture availability during the critical stages of crop growth I.e. germination, seedling growth, flowering, boll formation and development. Cotton is susceptible to water stagnation for long duration and therefore care should be taken to drain the excess water from the field. INTEGRATED PEST MANAGEMENT (IPM) The following integrated practices are recommended: - Follow summer ploughing and field sanitation as mentioned earlier - Seed treatment: BGII Cotton seeds are pre treated for controlling sucking pests, - Sucking pest control: If the infestation of sucking pests crosses the Economic Threshold Level (ETL) at any stage of the crop growth, spray recommended insecticides for control <table> <tr> <th>Pest</th><th>Economic Threshold Level</th></tr> <tr> <td>Jassids</td><td>1–2 nymphs or adults per leaf</td></tr> <tr> <td>Whiteflies</td><td>8–10 nymphs or adults per leaf</td></tr> <tr> <td>Aphids</td><td>10% plants infested</td></tr> <tr> <td>Thrips</td><td>10 nymphs or adults/leaf</td></tr> <tr> <td>Miles</td><td>1 adults or 20 nymphs/leaf</td></tr> </table> 4. Bollworm Control: - ETL-based insecticide sprays Supplementary insecticide sprays may be needed to manage boll-worm is if their population reaches or exceeds Economic threshold level hold (ETL). 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"Tolow insecticide recommendations of your local Agricultural University or Dept. of Agriculture Note: For other non-target insects like Spodoptera, Spodoptera, Spodoptera, etc., follow recommended practices - Other recommended IPM practices including trap/cropper crops, pheromone/light traps, bind practices, use of natural enemies, bio-rational insecticides (HaNPV, Neom) etc can also be followed - Avoid repeated use of same class of insecticides, Timely crop termination: Avoid rejuvenation (re-flushing) of Bollgard II crop in areas with high PBW incidence. Edended duration of crop cultivation provides opportunity for PBW population build-up and the carry-over to the pest to next season. Field sanitation: Bollworm larvae, especially PBW, may remain hidden in dried or improperly opened bolls Remove unopened bolls from cotton stalks or from the ground and bury in deep pits. Deep-ploughing: Carry-out deep ploughing after harvest to expose and kill pupae of all bollworms and diapausing larvae of PBW. MANAGEMENT OF COMMON DISEASES IN COTTON: Follow need based recommended practices for the control of diseases such as Alternaria leaf spot, Grey mildew, Leaf blight and Boll rotAmong the various leaf diseases nobcolod following are the important & more commonly observed diseases in cotton crop. ALTERNARIA LEAF BLIGHT (Alternaria macrospora): Alternaria leaf blight fincoms visible as small, pale brown circular spots on the leaves. The spots usually enlarge and develop concentric rings to produce a target board appearance. CERCOSPORALEAF SPOT (Cercospora gossypina): Cercospora leaf spot symptoms begin as reddish dots on the leaves. The lesions slowly increase in ciemler retaining a narrow red margin enclosing a white to light brown center of dead tissue GREY MILDEW (Remulario areola): Grey leaf spot symptoms begin in the form of irregular angular yellowish green spots on the leaves. The lesion slowly turn yellowish to reddish brown and whitish frothy fungal growth appears chiefly on the under surface but occasionally also on upper surface but occasionally also on the upper surface. BACTERIAL BLIGHT (Xanthomonas campestriis pv. malvacearum): the disease symptoms appear as angular spots on leaves, black vein or vein blight, black arm (blight on stems and branches) and boll blight. The lesions are water-soaked at first and then turn brown to black with age. MANAGEMENT: - Adequate nutrition and proper water management will protect the crop from predisposing to leaf diseases - Encourage sufficient FVM application - Agonomic measures of control will include wider spacing of paired row planting in order to reduce the humidity in the canopy - Removal and destruction of infected leaves will minimize the leaf spot severity - Crop should be sprayed with copper oxychloride or Wettable sulfur 2-2.5g/ - Bavistin 1-1.5g/L, to control fungal leaf spots. - Bacterial blight can be managed by spraying with copper oxychloride 2-2.5g+Streptocycline, 0.1g, Combined fungal and bacterial Infections can be managed by spraying with copper oxychloride 2-2.5g Bavistin 1-1.5g+ Streptocycline 0.1g. - Spraying should be started from the first appearance of the disease symptoms and should be repeated 2-3 times at 15-20 day intervals. MANAGEMENT STRATEGIES FOR WILT INCOTTON: The disease is more severe in light to medium type of soils under waller stress conditons, Fusarium oxysporum, Rhizoctonia solani and Rhizoctonia bataticola are the major biotic agents. In case of wilting symptoms due to water logging conditons, immediately drain out the field, and undertake drenching of systemic fungicides The wilt can occur at any stage of development. The symptoms on leaves are prostrate, yellowing, wilting and plants look dull in appearance and the leaves turn light to yellow green in color followed by total drying of the plants. Partial discoloration of stem from the base upward; vascular discoloration, and the rattling of roots from tips may be seen at later stage of wilting MANAGEMENT: - Timely irrigation will protect the crop from predisposing to wilt, in case the crop is planted under light soils. - Fields with history of wilt should be avoided for cotton cultivation. - Encourage sufficient FVM application - Crop should be sprayed with Nitrophoska-Foliar 3g/L at vegetative growth stage and with Nitrophoska-Foliar @3g/L + planofix @0.3 mL at flowering Control of adult plant infection: - Soil drench with Bavistin (Carbendazim) Contal (Hexaconazole) or Sheathmar (Validamycin) each @3g/L (0.5-1 L/plant) at 50-60 days after planting. - Soil drenching should be done either before the infestation of wilting or immediately after the appearance of first wilt symptoms before the drying of leaves/plants, infected seedlings with brown or black discoloration of crown. Harvesting: The Bollgard II Cotton crop needs to be harvested as per the normal harvesting practices. Disclaimer: The guideline's in this leaflet are gathered from various publications/sources. However soil type, adverse climatic condition and season, insufficient/irregular crop management and attack of pests and diseases may produce an adverse effect on crop and production. Crop management is beyond our control hence the farmers are fully responsible for production/yield. However we suggest them to get maximum yield by sowing the seed at the right time and through optimum crop management. Company shall not be liable for crop failure, despite following The guidelines. Stewardship Guidance: "The proper performance of Bollgard II cotton technology is dependent on farmers following product usage guidelines recommended by the Cotton Crop Management guidelines issued by Central and State Agricultural Institutes. Army non-adherence to these product usage guidelines may result in suboptimal performance of this insect tolerant technology. Situations of first bollworm incidence due to prevailing environmental conditions, including resistance in pink bollworm, if any, warrants adoption of recommended crop protection measures based on ETL (Economic Threshold Level) to mitigate the pest. The licensor of this technology shall not be liable for any performance issues arising due to farmers' failure to follow the recommended guidelines, nor shall it be liable for any germplasm related performance issues."	Pest	Economic Threshold Level	Jassids	1–2 nymphs or adults per leaf	Whiteflies	8–10 nymphs or adults per leaf	Aphids	10% plants infested	Thrips	10 nymphs or adults/leaf	Miles	1 adults or 20 nymphs/leaf	English
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- MANAGEMENT STRATEGIES FOR WILT INCOTTON:**
- The disease is more severe in light to medium type of soils under waller stress conditons, Fusarium oxysporum, Rhizoctonia solani and Rhizoctonia bataticola are the major biotic agents. In case of wilting symptoms due to water logging conditons, immediately drain out the field, and undertake drenching of systemic fungicides The wilt can occur at any stage of development. The symptoms on leaves are prostrate, yellowing, wilting and plants look dull in appearance and the leaves turn light to yellow
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 - Bacterial blight can be managed by spraying with copper oxychloride 2-2.5g+Streptocycline, 0.1g, Combined fungal and bacterial Infections can be managed by spraying with copper oxychloride 2-2.5g Bavistin 1-1.5g+ Streptocycline 0.1g.
 - Spraying should be started from the first appearance of the disease symptoms and should be repeated 2-3 times at 15-20 day intervals.

பீல்கார்ட் II. और बॉलवॉर्म् प्रबंधन के लिए रोपण निर्देश बेल्गार्ड II कॉटन हाइब्रिड दो बीटी प्रोटीन, Cry1Ac and Cry2Ab, which together manage the key lepidopteran pests of cotton in US American bollworm, Spotted bollworm, Pink bollworm and the Tobacco caterpillar. As per the Gazette notification 5,0,4215 (E) dated December 27, 2016, by Ministry of Agriculture and Farmer's welfare, Department of Agriculture, Cooperation and Farmer's welfare, Government of India, the seeds in this packet are mixed with 5% Non-Refuge. This technology does not provide control of sucking insect pests of cotton. Refugia-in-Bag (RIB) concept for insect resistance management: Blending 5% of non Bt seeds in Bt cotton seed packet is called Refugia in Bag (RIB) concept. Non Bt hybrid possesses similar duration and fiber properties as that of Bt hybrid. Minimal yield loss is expected due to mixing of non Bt seeds, however RIB helps in delay of insect developing resistance to Bt and enhances the durability of technology. The following general guidelines can help to get maximum benefits from Bollgard II cultivation Land Preparation: Remove and burn debris of previous crop for field sanitation. Give two deep summer ploughings to reduce soil borne diseases, insects and weeds. Prepare the field by repeated harrowing to bring the soil to suitable tilth. Manures and Fertilizers: As per 5 to 6 tonnes farm yard manure 3 to 4 weeks before sowing Fertilizers. Apply fertilizers as per the soil test report and local recommended practices Spacing: Spacing requirements should be adopted as per local recommended practices. Sowing method: Sow 2 seeds/hill for maintaining proper population. After germination, leave one vigorous plant per hill and remove the weak plant. Gap filling: To achieve optimum plant stand, if necessary gap for gap filling within a week period.Inter-Cultivation and weed control: Follow need based hand weeding and inter cultivation practices to check the growth of the weeds. It helps in better soil aeration and soil moisture conservation. Follow recommended herbicide application, if it is in practice. Irrigation: Ensure moisture availability during the critical stages of crop growth I.e. germination, seedling growth, flowering, boll formation and development. Cotton is susceptible to water stagnation for long duration and therefore care should be taken to drain the excess water from the field. INTEGRATED PEST MANAGEMENT (IPM) The following integrated practices are recommended: - Follow summer ploughing and field sanitation as mentioned earlier - Seed treatment: BGII Cotton seeds are pre treated for controlling sucking pests, - Sucking pest control: If the infestation of sucking pests crosses the Economic Threshold Level (ETL) at any stage of the crop growth, spray recommended insecticides for control <table> <tr> <th>Pest</th><th>Economic Threshold Level</th></tr> <tr> <td>Jassids</td><td>1–2 nymphs or adults per leaf</td></tr> <tr> <td>Whiteflies</td><td>8–10 nymphs or adults per leaf</td></tr> <tr> <td>Aphids</td><td>10% plants infested</td></tr> <tr> <td>Thrips</td><td>10 nymphs or adults/leaf</td></tr> <tr> <td>Miles</td><td>1 adults or 20 nymphs/leaf</td></tr> </table> 4. Bollworm Control: - ETL-based insecticide sprays Supplementary insecticide sprays may be needed to manage boll-worm is if their population reaches or exceeds Economic threshold level hold (ETL). To know if Boll-worm have reached ETL, scout Bollgard II field every week by taking the following steps. (I) For Farmer's bollworm (ABW), Randomly select 20 Bollgard II plants/acre. ETL is reached if you find 2 or more ABW larvae/20 plants. OR if you find 10% of the total bolls on these 20 plants damaged by ABW. (II) For pink bollworm (PBW) Select random 20 plants/acre. Count the number of flowers or mature bolls per acre, and count the number of pink bollworm larvae in 20 flowers or 20 bolls. ETL is reached if you count 2 or more PBW larvae in 20 flowers or 20 bolls. ETL can also be estimated from pheromone trap observations (3 traps per acre) ETL is reached if you observe an average of 8 PBW moths per trap per night, for three successive nights. successive nights. "Tolow insecticide recommendations of your local Agricultural University or Dept. of Agriculture	Pest	Economic Threshold Level	Jassids	1–2 nymphs or adults per leaf	Whiteflies	8–10 nymphs or adults per leaf	Aphids	10% plants infested	Thrips	10 nymphs or adults/leaf	Miles	1 adults or 20 nymphs/leaf	Handi
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