

New Technologies Developed for Inclusion in Package of Practices

CROP PRODUCTION (16)

AGRONOMY (10)

- **Optimization of seed rate for tractor operated drill sown finger millet:** Seed rate of 8 kg/acre is found to be optimum for sowing finger millet using tractor drawn seed drill compared to 20 kgs/acre seed rate in broadcasting method saving upto 12 kg/acre seeds.



- **Studies on pre-emergence chemical weed control in drum seeded rice:** Bensulfuron methyl (0.6% G) @ 60 g + pretilachlor (6%G) @ 600 g ai/ha (10 kg/ha) at 5 days after sowing as pre-emergence sand mix (25 kg/ha) application in drum seeded rice recorded statistically on par grain yield and weed control efficiency (4853 kg/ha and 95.72% respectively) as compared to two hand weeding (4871 kg/ha and 94.35% respectively).



Untreated Plot

Treated Plot

- **Nitrogen management in bajra napier hybrid grass for higher green forage yield and quality:** Application of nitrogen @ 315 kg /ha after each cut (6-7 cuts per annum) in equal splits significantly recorded higher green forage yield (1331 q/ha), dry matter yield (301 q/ha) and crude protein yield (23.2 q/ha) with high net monetary returns (Rs.82,926 /ha) and B:C ratio (2.73:1).



Untreated Plot



Treated Plot

- **Package of practices for browntop millet:** Chapter on Browntop millet is included in the package of practices with details on variety, soil, land preparation, seed rate, time of sowing, method of sowing, nutrient requirement, intercropping, weed management, plant protection and harvest.



- **Spacing & organic nutrient management under organic farming of nutri-cereals:**

Crop	Spacing	Nutrients
Foxtail millet	30* 7.5 cm	7.5 t/ha Farm yard manure as basal dose + 125% Nitrogen (50 kg N/ha) equivalent organic manure through compost (if compost has 0.8% N content then apply 6.25 t/ ha compost)
Little millet/ Kodo millet / Browntopmillet/ Proso millet / Barnyard millet	30* 7.5 cm	7.5 t Farm yard manure as basal + 125% Nitrogen (25 kg N/ha) Equivalent organic manure through compost (if compost has 0.8% N content then apply 3.125 t/ ha compost)

SOIL SCIENCE & AGRICULTURAL CHEMISTRY (5)

- **Schedule of water soluble phosphorus for sugarcane crop through micro irrigation:**
Providing recommended phosphorus through fertigation with water soluble phosphorus

fertilizers @ 25 per cent up to 60 days after planting and remaining 75 per cent up to 180 days after planting enhances the phosphorus use efficiency and increases cane yield by 30%



Untreated Plot



Treated Plot

- **Use of newly formulated micronutrient mixture for enhanced growth and yield of paddy in alkaline soil:** Foliar spray of micronutrients mixture @ 10g/l at 30 and 45 days after transplanting along with the recommended fertilizer reduces chaffyness by 38.4 per cent, enhances grain (15.2%) and straw yield (20.5%) with B:C ratio of 1.4:1.



- **Application of phosphorus enriched compost for improved soil properties and enhanced yield under ragi –cowpea cropping systems:** Application of 100 per cent nitrogen and potassium along with 50 per cent phosphorus through enriched compost (P source used for enrichment is rock phosphate) to phosphorus rich soil recorded B:C ratio of 2.90:1, highest ragi grain (2483.1 kg/ha) & straw (3943.2 kg/ha) yield as compared to 100 per cent recommended dose of fertilizers (Grain: 2276 kg/ha & straw: 3551 kg/ha) with FYM



+





- **UASB Blackgram micronutrient mixture (MMF1 & MMF2) for enhanced growth and yield of Blackgram:** Application of 750 g/acre of UASB black gram micronutrients mixture MMF1 (Fe + Mn + Zn + Cu + Mo) at 20 days and application of 1 kg/acre of UASB black gram micronutrient mixture MMF2 (Fe + Mn + Zn + Cu + Mo+ B) at 40 days after sowing will enhance black gram yield by 25.37 per cent with the B:C ratio of 3.18:1.



Untreated Plot



Treated Plot

- **UASB Greengram micronutrient mixture (MMF1 & MMF2) for enhanced growth and yield of greengram:** Application of 750 g/acre of UASB green gram micronutrients mixture MMF1 (Fe + Mn + Zn + Cu + Mo) at 20 days and application of 1 kg/acre of UASB green gram micronutrient mixture MMF2 (Fe + Mn + Zn + Cu + Mo+ B) at 40 days after sowing will enhance green gram yield by 34.33 per cent with B:C ratio of 3.34:1.



Untreated Plot



Treated Plot

AGRICULTURAL MICROBIOLOGY (1)

- **Sugarcane trash decomposition using microbial consortium:** Spread the trash after the harvest in alternate rows and irrigate the field. Spread 10kg/acre of urea and microbial consortium (10% cowdung + 4 kgs/acre of microbial consortium: *Phanerochete* + *Aspergillus* + *Pleurotus* + *Trichoderma* + *Pseudomonas* + *Bacillus* + *Cellulomonas* in 400 litres of water) over the irrigated trash. After 30 days, turn the trash and repeat the same application. Within 75-90 days of application, the trash decomposes and supplies nutrients to the ratoon crop. This saves 25-30 per cent of chemical fertilizer application and enhances soil fertility.



CROP PROTECTION (18)

ENTOMOLOGY (7)

- **Spinetoram Seed treatment of pulses for managing pulse beetle during storage:** After threshing, the pulse seeds should be dried to bring down the seeds moisture below 10 per cent. Then treat the pulse seeds with spinetoram 11.7% SC @ 2.5 ml + 50 ml water/10 kg seed. Shade dry the treated seeds for 3 to 4 hours and store the seed in gunny bag. The treated pulse seed are free from pulse beetle infestation up to 6 months of storage. It also helps in maintaining the seed quality parameters up to 12 months of storage.



➤ **Management of wild boar in groundnut field:**

- ✓ Fixing of nylon net around the border of the groundnut field up to 4 feet height from the ground and trailed on the ground up to 2 feet and covered with soil significantly reduced the wild boar menace with B:C ratio of 4.3:1. **OR**
- ✓ Fixing of used sarees around the border of the groundnut field up to 3 feet height & trailed on the ground up to 3/4 feet & covered with soil significantly reduced wild boar menace with B:C ratio of 3.7:1



- **Spraying of spinetoram for management of thrips on chilli:** Spraying of spinetoram 11.7 SC @ 1 ml/l of water (1st spray: when the incidence is observed and second spray if required at 15 days after 1st spray), reduced the thrips incidence by 86 per cent and enhanced the yield by 35 per cent with B:C ratio of 3.07:1 compared to untreated control.



- **Spraying Spinetoram or chlorantraniliprole for management of tomato pinworm, *Tuta absoluta*:** Spraying of spinetoram 11.7 SC @ 0.75 ml/l of water (1st spray: when the incidence is observed and second spray if required at 15 days after 1st spray), reduced the pinworm incidence by 80 per cent and enhanced the yield by 62 per cent with B:C ratio of 2.19:1 compared to untreated control or Spraying of chlorantraniliprole 18.5 SC @ 0.3 ml/l of water (1st spray: when the incidence is observed and second spray if required at 15 days after 1st spray), reduced the pinworm incidence by 72 per cent and enhanced the yield by 56 per cent with B:C ratio of 2.11:1 compared to the untreated control.
- **Spraying of Flonicamid for management of sucking pest in Cotton:** Spraying of flonicamid 50 % WG @ 0.3g/l at 45 days after sowing and 2nd spray when the sucking pests crosses the ETL recorded least population of sucking pests (whiteflies, thrips, leafhoppers and aphids) and higher seed cotton yield (20.20 q/ha) with B:C ratio of 3.14:1.



- **Management of rugose spiraling whitefly on coconut using bio rational insecticides:**
 - ✓ Spraying on lower surface of coconut palm leaves with azadirachtin 1% @ 2 ml recorded 41.92 and 54.64 per cent reduction in nymphal population of spiraling whitefly at 5 and 10 days after spraying and 39.55 and 63.96 per cent reduction in adult population **OR**
 - ✓ Spraying with neem oil @10 ml + soap 10 gram recorded 55.12 and 58.11 per cent reduction in nymphal population of spiraling whitefly at 5 and 10 days after spraying and 51.79 and 61.57 per cent reduction in adult population
- **Spraying of entomopathogenic fungi, *Lecanicillium lecanii* for management of rugose spiraling whitefly in coconut ecosystem:** Spraying eco-friendly entomopathogenic fungi, *Lecanicillium lecanii* @ 5g/l (cfu 2×10^8 /g) of water on lower surface of coconut leaves

recorded 40.23 and 64.32 per cent reduction in nymphal population of spiraling whitefly at 5 and 10 days after spraying and 44.73 and 90.37 per cent reduction in adult population



Colony of Whiteflies



Dead whitefly

PLANT PATHOLOGY (11)

- **Spray of chitosan for management of Sheath blight disease in Rice:** Two sprays of chitosan 1 g/l of water at 30 and 60 days after transplanting reduced the rice sheath blight incidence by 62.90 per cent. The yield increased by 35-40 per cent with 52 per cent reduction in grain chaffiness and B:C ratio of 2.46:1.



- **Seed treatment with *Pseudomonas* and spraying tricyclazole & mancozeb for management of neck and finger blast in ragi:** Seed treatment with *Pseudomonas fluorescens* talc formulation @10g /kg of seed followed by spraying of tricyclazole 18%+ Mancozeb 62%@ 0.5g/l of water at the time of flowering and if required, second spray at 10-15 days interval was effective in the management of neck and finger blast. It also enhanced the grain yield (2691 Kg/ha) and fodder yield (3900 Kg/ha) with B:C ratio of 2.45:1.



Treated Plot



Untreated Plot

- **Soil drenching of Bleaching Powder and application of Streptocycline sulphate for management of bacterial stalk rot of maize:** Soil drenching of bleaching powder @ 0.1 g/l + streptocycline sulphate @ 0.4 g/l around the infected plants reduced the disease incidence by 74 per cent and increased the yield up to 141.4 per cent with B:C ratio of 2.18:1 as compared to untreated control.



- **Integrated disease module for management of *Turicum* leaf blight in maize:** Seed treatment with *Trichoderma harzianum* @ 10g/kg seed + foliar application of nimbicidine @ 5ml/litre @ 35 DAS, followed by azoxystrobin 18.2% + difenoconazole 11.4% (amistar top) spray @ 1 ml/ litre of water at 45 days after sowing reduced the disease incidence by 65 per cent and increased the yield by 75 per cent with 3.8:1 B: C ratio.



Treated Plot

Untreated Plot

- **Management of *Alternaria* leaf spot:** Seed treatment with 12% carbendazim + mancozeb 63% WP @ 2g/kg seed followed by two foliar sprays with difenconazole 25% + propiconazole 25% @ 0.25ml/l (First spray at the onset of incidence or 45 days after sowing and if required 2nd spray should be given 15 days after 1st spray) reduces the disease by 64.38 per cent over check, with 28.4 per cent increase in yield and 18.3:1 B:C ratio. In addition, it also controls powdery mildew disease in the crop.



- **Spraying of propiconazole for management of leaf blight in brown top millet:** Spraying of propiconazole 25% EC @ 1 ml/l at 35-40 days after sowing (when the leaf blight symptoms are observed) was effective in reducing leaf blight incidence by 65.43 per cent and increased grain yield by 191.1 per cent with 2.28:1 B: C ratio.



Treated Plot



Untreated Plot

- **Spraying of mancozeb + carbendazim for management of rust in cowpea:** Spraying of mancozeb 63% + carbendazim 12% WP @ 2g/l at 35-40 days after sowing (when rust symptoms are observed: 2-3 rust pustules) was effective in reducing rust incidence by 65.81 per cent and increased yield by 81.48 per cent with 3.17:1 B:C ratio.



Treated Plot



Untreated Plot

- **Spraying of azoxystrobin & difenconazole for management of powdery mildew in chilli:** When symptoms are observed, spraying of azoxystrobin 18.2% + difenconazole 11.4 % @ 1.2 ml/l two times at an interval of 15 days was found to be effective in reducing disease incidence by 83 per cent with 2.03:1 B:C Ratio



- **Spraying of hexaconazole for management of Cercospora leaf spot in cowpea:** Spraying of hexaconazole 5% SC @ 2ml/l at 35 days after sowing (when leaf spot symptoms are

observed) was effective in reducing cowpea leaf spot by 64 per cent & increased yield by 78.39 per cent with 3.87:1 B: C ratio.



Treated Plot



Untreated Plot

- **Spraying of tebuconazole & trifloxystrobin for management of powdery mildew in mango:** Spraying of tebuconazole 50% + trifloxystrobin @ 0.4 g/l during flowering and if disease persists 2nd spray in the interval of 30 days was found to be effective in reducing the disease incidence by 85 per cent with B:C Ratio of 13.11:1



- **Spraying of fungicides for management of black spot of papaya:** Spraying of mancozeb 50 WP 2g/l, Difenoconazole 25 EC 1ml/l and tebuconazole 50 + trifloxystrobin 25 WG 0.5 g/l after disease initiation at fifteen day interval was found effective in reducing 83.95 and 88.44 per cent black spot symptoms on leaves and fruits respectively with B:C ratio of 3.25:1 and the fruits could be harvested fifteen days after the spray for edible purpose.

SERICULTURE (1)

- **Foliar spray of cultivated sea plant (*Kappaphycus* sp.) extract for enhanced growth and development of mulberry and silkworm:** Foliar spray of cultivated sea plant extract

(*Kappaphycus* sp.) LBS 13 @ 1.5 ml/l acts as growth promoter in mulberry (chlorophyll: 30 days after pruning – 2.37 mg/g, 45 days – 2.55 mg/g, 60 days – 3.85mg/g) and helps in reducing incidence of NPV infection (larval mortality: 3.3% & disease incidence: 11.3%) in silkworm



Treated Plot

Untreated Plot

APICULTURE (2)

- **Six frame hives for *Apis cerana*:** The initiation of honey was earlier in 6 frame hives compared to 8 frame hives (as in PoP). The absconding behavior was more in 8frame hives (28%) compared with 6 frame hives (16%). Similarly the swarming behavior was recorded higher with existing ISI-8frame hives. The growth and development of colony is significantly higher in 6 frame hive compared to 8 frame hive. Hence the use of 6 frame bee hives will be more suitable for higher honey production.



- **Pollen substitutes and its feeding methodology in *A. cerana* colonies:** Honey bees showed better acceptance when pollen substitutes were fed through parchment paper followed by

petriplates and polyethene cover. Following Pollen substitutes (in gms) when supplied reduced the absconding activity during dearth period.

- ✓ Ragi flour + Milk Powder+ Yeast+ Honey (1.88+1.88+1.25+5) or
- ✓ Ragi flour + Horlicks powder + Honey (1.88+3.12+5) or
- ✓ Yeast + Bengal gram + Milk powder + Sugar (4.2+0.4+0.4+5) or
- ✓ Green gram flour + Milk Powder+ Yeast+ Honey (1.9+1.9+1.2+5) or
- ✓ Green gram flour + Horlicks powder + Honey (1.9+3.1+5) or
- ✓ Soy flour + Wheat flour + Yeast + Sugar + Dark rum (1.8+1.8+1.2+5+0.2)