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STANDARD PACKAGE OF PRODUCTION PRACTICES FOR FCV TOBACCO IN NLS REGION OF ANDHRA PRADESH

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FCV tobacco grown under irrigated Alfisols during *rabi* season in West Godavari, East Godavari districts of A.P and Khammam district of Telangana is known as Northern Light Soil (NLS) tobacco. FCV tobacco produced in this zone is mature, ripe, bodied, open grained, lustrous, semi flavourful and highly priced. NLS soils are light textured, well drained, moderately acidic, low organic carbon, medium to high in available P&K and are highly suitable to FCV tobacco cultivation.

Site selection and land preparation

- Select deep sand and sandy loam soils with good drainage, low in soluble salts (<0.40 dS/m, soil chlorides < 100 ppm)
- Deep summer ploughing with disc is recommended for minimizing weeds, *Orobanche* infestation, insect pest and disease incidence and to improve water and nutrient conserving capacity of the soil
- Apply 10 tonnes of Farm Yard Manure /Filter Press Cake per hectare or grow green manure crop (Sunnhemp @ 50 kg seed/ ha) and incorporate before flowering
- Plough the field 2-3 times with mould board or disc plough followed by two cross ploughings with cultivator and planking for levelling the field

Recommended varieties / hybrids

- Kanchan, LT Kanchan and CH1

Seed bed preparation and seedlings selection

- Apply 25 kg FYM, 300 g of single super phosphate, 50 g of ammonium sulphate, 100 g of potassium sulphate and 50 g of Dolomite or 50 g of magnesium sulphate per 10 sq.m. bed as basal dose
- Healthy seedlings of 50-60 days duration with pencil thickness are normally preferred
- Tray seedlings will overcome the problem of diseases and preclude transplantation shock. Tray nursery seedlings offer the unique advantage of ensuring crop uniformity with minimum gap fills and consequently increase cured leaf yield and quality as against the seedlings raised from soil-bed nursery

Time and method of planting

- Transplant during 15th Sept. to 15th Oct. in upper NLS and 15th Oct. to 15th Nov. in lower NLS
- After land preparation, mark the planting position by running a marker in cross directions at a spacing of 100 X 60 cm (16,666 plants/ha)
- Plant the tobacco seedlings (tray seedlings) manually at the edge of the furrows made by plough
- Gap fills are minimum with tray seedlings and is to be completed within 7 days

Interculture

- Interculture operations are to be done 3-4 times depending on weed population at fortnight intervals
- If interculture is not possible, application of quizalofopethyl (60g/ha) is recommended to control weeds
- Ridges are to be made with ridger at 40 days after transplanting to provide anchorage to the plant
- Earthing up the ridges as and when required. Interculture between irrigations for better percolation of water into the soil and to avoid surface run off

Irrigation

- Irrigate with water from canals, tanks, wells and bore wells with less than 50 ppm chloride
- Give 8-10 irrigations as per the climate and the crop growth through furrow irrigation
- In drip irrigation, laterals are to be placed on ridges with drippers at each plant. Irrigate on alternate days for 15 - 30 minutes depending on crop stage
- Drip irrigation significantly improves the yield and quality apart from increasing the water use efficiency

Fertilizer application

- Fertilizers are to be applied in 3 splits *viz.*, 7-10 days, 25-30 days and 40-45 days. Dollop method of application at 10 cm depth on both sides of plant is to be followed. The type, dose and the time of application of fertlizers is given below :

Time of application	Name of the Fertilizer	Dose (kg/ha)	N -P_2O_5-K_2O-Ca (kg/ha)
Basal application	Dolomite	200	0-0-0-48
I Split/ha	Di-Ammonium Phosphate	100	18-46-0-0
	Sulphate of Potash	100	0-0-50-0
II Split/ha	Ammonium Sulphate	250	51-0-0-0
	Sulphate of Potash	100	0-0-50-0
III Split/ha	Urea	100	46-0- 0-0
	Sulphate of Potash	100	0-0-50-0
	Total		115-46-150-48

- In very light soils, apply potassium sulphate 300 kg/ha in 4 splits (75 kg each) and apply the 4th split on 70 DAT for increasing the quality and yield

Leaching Adjustment

- After the second dose of fertilizer application, if percolation of rain is 12.5 cm, apply top dressing of 6 kg N/ha and 7.5 kg of K_2O/ha
- If rain percolation is to an extent of 25 cm, apply 15 kg N and 20 kg K_2O/ha as top dresser

Fertigation

- Fertigation with 80% of recommended doses with soluble fertilizers through drip irrigation will improve the yields and save fertilizers up to 20%

Pest Management

1. Ground beetle (*Mesomorphus villiger*)

- Spray chlorantraniliprole 18.5 SC @ 3 ml/10 L water one day before transplanting on the nursery bed or trays
- Apply 5 g of pongamia cake or neem cake powder (mixed in handful of sand) at the base of the seedling immediately after transplanting
- If seedlings are not treated before transplanting, apply imidacloprid 200 SL @ 2.5 ml or chlorantraniliprole 18.5 SC @ 3 ml/10 L in transplant water
- In the newly planted field, keep grass heaps 6-7 m distance apart between rows on a moist soil and destroy them next day

2. Leaf eating caterpillar (*Spodoptera litura*)

- Install 10 pheromone traps per hectare 20 days after planting
- Spray the hot spots thoroughly with 0.5% neem seed kernel suspension
- *Spodoptera* NPV (Nuclear Polyhedrosis Virus) can be sprayed @ 250 LE (prepared by mixing 250 infected larval mixture in 1000 litres of water per hectare by mixing with 2.5 kg jaggery)
- If the infestation is severe, spray emamectin benzoate 5 SG @ 5 g in 10 litres of water (or) Novaluron 10 EC @ 10 ml in 10 litres of water

3. Whitefly (*Bemisia tabaci*)

- Install 10 yellow sticky traps (12 x 15 cm size with 2 mm thickness) per hectare to monitor the whitefly population
- If the population of whitefly is 100 per trap, give the following spray schedule of insecticides
- 1st spray-Thiamethoxam 25 WG @ 2 g (or) pymetrozine 50 WG @ 4 g (or) flonicamid 50 SG @ 4g (or) imidacloprid 200 SL @ 2.5 ml in 10 litres of water
- 2nd spray -15 days after 1st spray and 3rd spray -15 days after 2nd spray with any one of the above insecticides

4. Tobacco aphid (*Myzus nicotianae*)

- When 2% of the plants are infested, use any one of the following insecticides *viz.*, Imidacloprid 200 SL @ 2.5 ml (or) thiamethoxam 25 WG @ 2 g (or) flonicamid 50 SG @ 4 g (or) pymetrozine 50 WG @ 4 g in 10 litres of water

5. Budworm / Capsule borer (*Helicoverpa armigera*)

- Plant marigold as trap crop in two rows around the field to attract ovipositing female moths; this helps in easy collection and destruction of eggs and larvae
- One month after planting, install 10 Helicoverpa pheromone traps per hectare
- Arrange 10 bird perches per hectare in untopped fields, spray Helicoverpa Nuclear Polyhedrosis Virus (HaNPV) @ 250 LE/ha (prepared with 250 infected larvae in 1000 litres of water, add 2.5 kg jaggery)
- Apply *Bacillus thuringiensis* var. *kurstaki* (Bt) @ 10 g in 10 litres of water
- Spray Bt and NPV in the evening hours
- When the infestation is above 10 %, spray flubendiamide 480 SC @ 2.5 ml (or) chlorantraniliprole 18.5 SC @ 3 ml in 10 litres of water

Disease management

1. Brown spot (*Alternaria alternata*)

- Apply the recommended potash fertilizer dose
- Propiconazole @ 0.1% (10 ml/10 L water) is to be sprayed in such a way to cover the entire surface of the leaf

2. Black shank (*Phytophthora parasitica*)

- Crop rotation is to be followed in frequently infected fields
- Apply 75-100 ml of 0.4% Bordeaux mixture/ plant (40 g of Copper sulphate + 40 g of lime in 10 L of water)
- Spray copper oxychloride @ 0.2% concentration (20 g/10 L of water) around the plant base (or) fenamidone + Mancozeb 60 WG (30 g in 10 L of water) (or)
- Spray metalaxyl + mancozeb combination (72 WP) @ 0.2% (20 g/ 10 L of water) but it must be restricted to two sprays

3. Fusarium wilt (*Fusarium oxysporum* (Schlecht) Wr.)

- Adequate organic matter in soil helps to reduce the Fusarium wilt disease
- Application of bio-agent enriched vermicompost/press mud/ FYM
- Green manuring with sun hemp
- Crop rotation with sorghum/ maize for at least two years is beneficial

4. Cucumber mosaic virus (CMV)

- Aphid, vector of this virus has to be controlled to prevent the spread of this disease
- For management of aphids, spray Imidacloprid 200 SL @ 2.5 ml (or) thiamethoxam 25 WG @ 2 g (or) flonicamid 50 SG @ 4 g (or) pymetrozine 50 WG @ 4 g in 10 litres of water
- Remove and destroy severely infected tobacco plants

5. Leaf curl virus (TLCV) (*Ruga tabaci*)

- Whitefly, vector of this virus has to be controlled to prevent the spread of TLCV disease
- Install yellow sticky traps of 12 x 15 cm size @ 12/ha for monitoring the vector whitefly
- Spray imidacloprid 200 SL @ 2.5 ml (or) thiamethoxam 25 WG @ 2 g (or) Flonicamid 50 SG @ 4 g (or) pymetrozine 50 WG @ 4 g/ 10 litres of water on ten days seedlings before pulling in the nursery
- Spray the above chemicals 3-4 times 10 days after transplanting in the field at an interval of 15 days

- Remove and destroy severely infected plants

6. Tobacco mosaic virus (TMV) (*Marmor tabaci*)

- Strictly follow the sanitary measures and should not touch the infected plants
- Workers should wash their hands with soap water before and after entering infected fields
- Prophylactic sprays of plant extract like Basella or Bougainvillea or neem @ 1% or 0.5% skimmed milk on 30th, 40th and 50th DAP to prevent spread of the disease to some extent

7. Broomrape (*Orobanche cernua*)

- Deep summer ploughing is recommended
- Instead of growing tobacco continuously, grow non-host or trap crops (Jowar, Sesamum, Blackgram & Greengram)
- Dollop method of neem cake application @ 100 kg/acre on both sides of plants (30-35 days)
- Careful removal of spikes before flowering or seed setting reduces the *orobanche* seed load
- Above said measures if followed in integrated manner, *orobanche* infestation can be reduced

Topping and sucker control

- The ideal time for topping is at extended bud stage (22-26) depending upon the variety and crop growth / condition
- Apply 10 ml of Decanol @ 4% or Rayalten @ 4% or Suckerout @ 3.5% per plant in the top 5-6 axils, to control the suckers

Harvesting

- Each time harvest 2-3 matured leaves
- Leaves are harvested from bottom (1&2 primings) on slightly greener side, middle leaves (3-6 primings) when they are ripe and top leaves (7 and above pickings) when they are fully ripe
- Harvest before 9.00 am and do not expose the harvested leaf to hot sun and soil
- Delay the harvesting for 3-4 days, if there is a rain

Curing

- After stringing and loading of the the harvested leaves, curing is to be done as per the schedule and bulk the cured leaf

Stages	Temperature		Ventilators	Time
	Dry bulb	*Wet Bulb*		(hrs)
Yellowing	90 to 105 °F	80 to 94°F	Top and bottom ventilators are gradually opened to 2 inches	36-48
Colour fixing	105 to 120°F	94 to 98°F	Bottom ventilators are opened to 3-5 inches at the base and top ventilator is raised to a height of 3-5 inches from the roof	5-11
Leaf drying	120 to 145°F	98 to 110°F	Top and bottom ventilators are gradually closed	25-40
Midrib drying	145 to 160°F	110 to 114°F	Ventilators closed	24-36

Fuel for flue-curing

- Traditional fuel: Fire wood
- Alternative fuel: Coconut fronds/husk, hulled maize cobs, Agri biomass briquettes and solar energy (PCRB)

Problems in Flue-curing and their management

1) Barn rot

- Occurs when moist leaves are harvested and loaded in the barn. It can be managed by avoiding leaf harvesting when they are moist

2) Sponging

- Avoid rapid drying at high temperatures during yellowing and overloading of barn

3) Barn scald

- Avoid increasing the temperature by not more than 1 to 2^0F per hour

4) Dark Green grades

- Avoid curing of immature leaves and raising temperatures beyond 105^0F before yellowing is completed

5) Cooked / caramelized leaf

- Avoid increasing temperature beyond 160^0F during midrib drying and loading of leaf nearer to flue pipes

6) Run back

- Maintain the required temperature during midrib drying stage

Grading, Baling and NTRM

- Bulking is very essential for developing the desired quality and to maintain the proper moisture in the leaf. Turn the bulks once in a week depending upon the moisture content in the leaf
- Plant position grading is followed in light soils based on leaf positions *viz.*, Primings (P), Lugs and Cutters (X), Leaf (L) and Tips (T). In each plant position, leaf is segregated into different grades based on color. For the purpose of green color grades, the plant is divided into two positions Bottom (P and X) and Top (L and T)
- PL, scrap, bits etc. are classified as No grades (NOG)
- Bale the leaf at optimum moisture conditions and make bales grade-wise. Mixing of different grades in one bale fetches less rate in the auctions
- Avoid non-tobacco related materials (NTRM) like sand, weeds, plastics, hessian cloth / gunny pieces, paper bits, broomstick pieces, etc. in bales

NOTE: Cultivation of tobacco as per the crop size and area fixed by Tobacco Board will ensure fair price to the farmers

For further details please contact Director, ICAR-CTRI, Rajahmundry

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