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24AG201 - CROP PRODUCTION TECHNOLOGY

UNIT 4

PRODUCTION PRACTICES OF AGRICULTURAL CROPS

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Generalized management and cultivation practices for important groups of field crops in TamilNadu: cereal crops, grain legumes, oilseed crops, sugarcane, and fiber crops, and special purpose crops such as those grown for green manure and fodder.

CEREALS

These are all food crops under *Poaceae* family.

Mainly cultivated for food for humans

Importance of cereals:

- Major food crop of majority of world population. Rice is consumed by more than 4 billion and wheat by rest of the population
- Prime activity of the farming of the world
- It gives employment to many
- It is the major industry of all

Important cereals:

They are grouped as cereals and millets based on the usage and grain size. Cereals are major food grains; grain size, area of cultivation etc are higher than millets. Millets are also food crops but cultivated in smaller area.

Major cereals are:

1. Rice(*Oryza sativa*)
2. Wheat(*Triticum sp*)
3. Maize(*Zea mays*)

Millets are grouped into major millets and minor millets again based on area ,usage and importance.

Major millets are:

1. Sorgum (*Sorghum bicolor*),
2. Finger Millet/ Ragi (*Eluesine coracana*)and
3. Cumbu/ PearlMillet(*Pennisetum glaucum)*

Minor millets are:

1. Thenai – *Setaria italic*/ Foxtail millet- *Kangni*
2. Varagu –*Paspalum scrobiculatum* Kodomillet- *Kodra*
3. Samai –*Panicum sumatrense/*Little millet -*Kutki*
4. Panivaragu -*Panicum miliaceum/*Proso/Common millet-*Cheena*

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5. Kudiraivali - *Echinocloa frumentacea/* Barnyard millet-*Sawan*

1. **Rice (***Oryza sativa***)**

Transplanted rice

Nursery area

Select 20cents (800 m2) of land area near to water source for raising seedlings for one hectare.

Seed rate

30 kg for long duration

40 kg for medium duration
60 kg for short duration varieties and 20 kg for hybrids

Seed treatment

- Treat the seeds in Carbendazim at 2 g/l of water for 1 kg of seeds. Soak the seeds in water for 10 hrs and drain excess water.

Forming Seedbeds

- Mark plots of 2.5m breadth with channels 30 cm wide all around the seedbeds.
- Level the surface of the seed bed, so that the water drains into the channel.

Sowing

- Sow the sprouted seeds uniformly on the seed bed, having thin film of water in the nursery.

Nursery-Water Management

- Drain the water 18 to 24 hrs after sowing
- Care must be taken to avoid stagnation of water in any part of the seedbed.
- Allow enough water to saturate the soil from 3rd to 5th day. From 5th day onwards, increase the water depth to 1.5cm depending on the height of the seedlings.
- There after maintain 2.5 cm depth of water.

Nursery-Weed Management

- Apply any one of the pre-emergence herbicides viz., Pretilachlor + safener 0.3kg/ha, on 3rd or 4th day after sowing to control weeds in the lowland nursery.
- Butachlor 2.0 l/ha Herbicides should be applied on 8 DAS with thin layer of water in the field

Nursery-Nutrient Management

- Apply 1tonne of fully decomposed FYM or compost to 20cents nursery and spread the manure uniformly on dry soil.
- Basal application of DAP is recommended when the seedlings are to be pulled out in 20-25 days after sowing in less fertile nursery soils.

Main Field Management Land preparation

- Plough the land during summer to economize the water requirement for initial preparation of land.
- Flood the field 1 or 2 days before ploughing and allow water to soak in. Keep the surface of the field covered with water.
- Keep water to a depth of 2.5 cm at the time of puddling

Optimum age of seedlings for quick establishment

- Optimum age of the seedlings is 18-22days for short,25-30 days for medium and 35-40 days for long duration varieties.

Pulling out the seedlings

- Pull out the seedlings at the appropriate time(4thleafstage).
- Pulling at 3rd leaf stage is also possible.

Planting seedlings in the main field

Soil	**Medium and low fertility**			**Highfertility**		
Duration	Short	Medium	Long	Short	Medium	Long
Spacing(cm)	15x10	20x10	20x15	20x10	20x15	20x20
Hills/m2	66	50	33	50	33	25

- Transplant 2-3 seedlings/hill for short duration and 2 seedlings/hill for medium and long duration varieties

Gap filling

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- Fill the gaps if any within7-10 days after planting

Nutrient Management

- Apply 12.5 t of FYM or compost or green leaf manure @6.25t/ha.
- If the above recommendation are not able to be followed, adopt blanket recommendation as follows:

Short duration varieties (dry season)			
a)Cauvery delta & Coimbatoretract	150	50	50
b)For other tracts	120	40	40
season)			
Medium and long duration varieties(**wet**	150	50	40
Hybrid rice	175	60	60
Low N responsive cultivars(like Improved75* WhitePonni)		50	50

Weed Management

- Use of rotary weeder from 15 DAT at 10 days interval. It saves labour for weeding.
- Use Butachlor 1.25kg/ha as pre-emergence application. Followed by one hand weeding on 30 - 35 DAT will have a broad spectrum of weed control.

Water Management

- Puddling and leveling minimizes the water requirement
- Plough with tractor drawn cage wheel to reduce percolation losses and to save water requirement up to 20%.
- At the time of transplanting, a shallow depth of 2 cm of water is adequate since high depth of water will lead to deep planting resulting

  In reduction of tillering.
- Maintain 2cm of water upto seven days of transplanting.

Harvesting

- Taking the average duration of the crop as an indication, drain the water from the field

7 to 10 days before the expected harvest date as draining hastens maturity and improves harvesting conditions.

- When 80% of the panicles turn straw colour, the crop is ready for harvest. Even at this stage, the leaves of some of the varieties may remain green.
- Confirm maturity by selecting the most mature tiller and dehusk a few grains. If the rice is clear and firm, it is in hard dough stage.

2. Maize

Zea mays

Maize cultivars in India

i. Varieties
    i. CO1, K1
ii. Hybrids
    i. Seeds has to be fresh again and again
        1. Many hybrids
            2. Ganga1(1961),toGanga11,Deccan105,Trishulata, Deccan107
        3. COH1,COH2,COH3,COBC1

Seasons

iii. Mostly during Kharif
    i. Early sowing in Apr-may in Mysore
    ii. Irrigated End of May to June
iv. Cultivation is also there in rabi season with good yield

Field preparation

v. Well drained light soils with good depth
vi. Deep ploughing is facilitating the soil moisture movements
vii. Ridges and furrows for irrigated crops
viii. Moderate tillage is sufficient
ix. But FYM should be incorporated and decomposed

Spacing & plant density

x. 60-70, for irrigated kharif season and
xi. A density of 80,000-100,000 in Rabi

Seed rate

xii. 60 x 20 cm requires15-20 kg seeds
xiii. 45-50 x 20 requires 25-30 kg

Planting depth

xiv. Generally7-8 cm in flat beds
    i. Earthed up during later
xv. 2/3 from top of the ridge and bring to middle of the ridge at around earth up

Nutrient management

xvi. Recommendation varies according to zone

i. In Tamil Nadu

ii. 135–62.5-60kg N. $P_2O_5$and K_2O /ha

iii. P&Kallbasal

Water management

xvii. It is a crop highly sensitive to excess moisture and moisture stress also

xviii. Flooding the root zone affecting the aeration and reduces the grain yield

xix. Stress at tasseling and silking stage can reduce the yield by 13% per day of stress

xx. Scheduling of irrigation

i. Critical stages are

1. 6 th leaf
2. Late knee high
3. Ttasselling
4. 50% silking and
5. Dough stages

Weed management

xxi. Crop-weed competition is 6weeks

xxii. Under rainfed flat system two hoeings and earth up is essential

xxiii. Herbicides:

i. Atrazine@1kgaspre-emergence

Harvest

xxiv. Sheath covering the cob turns yellow and dry

xxv. The seeds become hard and dry

Harvest the cob by breaking /cutting the cob alone

- Remove the sheath
- Thresh the cob after sun drying the grains
- Use machinery for threshing

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Millets

They are also cereals but they are generally called as millets since their area, production and their economic importance are less than the major food crops.

3. Sorghum

Sorghum bicolor

Soils suitable for sorghum

- Wide variety of soils
- pH range 5.5to7.5
- It can tolerate consider able salinity
- Medium and black soils are predominantly used in India
    - Kharif–Light soil
    - Rabi-black cotton soil

Seasons suitable for sorghum

- Both Kharif and Rabi in all India
- In TN
    - Jan-Feb (Thai)
    - Apr-May (Chittirai)
    - Jul-Aug (Aadi)
    - Sep-Oct (Purattasi)

Methods of raising Sorghum Irrigated

    - Direct seeded
    - Transplanted
- Rainfed
    - Direct sown

Nursery technique for transplanted crop

- Seed rate7.5kg in 7.5cents
- Treat the seeds with carbendazim @ 2g kg-1 of seed
- Age of seedlings 18days–maximum
- Delayed planting reduces grain yield

Field preparation

- Deep tillage using mould board plough for red shallow and medium deep soils
- In deep to very deep soils –deep ploughing once in 2 or 3years
- Off season tillage can help reducing the time
- FYM/Compost-12.5t
- Ridges and furrows
- Furrow length 6m

Time of planting /sowing

- Pre-monsoon sowing
- Seed hardening

Spacing

- 45 rows x 15 cm for plants(1.48lakh)

Seed rate(kg/ha)

- Transplanted–7.5
- Direct seeding10.0
- Rainfed direct seeding15.0

Varieties

- For TN
  - oCO25 – 115-120days
  - oCO26 – 105-110days
  - BSR1–105-110 days
  - CSH5, COH4, COH5etc

Sowing

- Transplant single seedlings after the furrow is irrigated
- Transplant 2-3 cm deep on the ridge half distance from top
- For direct seeding-irrigated
  - Seed rate10kg/ha
  - Treat the seeds and sow 2 seeds per hole
  - Depth of sowing 2-3cm

Nutrient management

- Schedule varies according to system, soil and season
- In TN NPK recommended are
  - o90:45:45 kg for irrigated
  - 40-20-0 kg for rainfed
    - N splits as 50% basal 50 % top at 15DAT / 25-30DAS

Water management

- Average 400mm

- Cool rainy season 350-500mm
- Summer 600-700mm

Irrigation schedule

- Critical stage approach
    - Growth–25-30 DAS
    - Flag leaf–50-55 DAS
    - Flowering–60-70 DAS
    - Grain filling–80-90 DAS

Intercultural operations

- Thinning and gap filling to be completed before10-15 after emergence
- Weeding
    - Herbicides
        - Atrazine 0.25 for pure crop
        - Pendimethalin for pulses intercropped situation

Harvest

- When the grain becomes hard and less than 25% moisture
- Need not wait for stubble and leaf to dry.
- Harvest the ear head then the plant
- Ear heads are threshed by threshers
- Grains dried and dried at 10-12% moisture

GRAIN LEGUMES (PULSES)

1. Red Gram (PIGEON PEA)

Cajanus cajan

Climate

- Highly drought resistant
- Temp of 18–27° C is desirable