*Reference: - eagri.org*

# CROP RESIDUE MANAGEMENT

### ➢ ROTO tillage

- Roto tillage is done by rotavator, which combine both primary and secondary tillage.
- Saving 60 – 70 % of operational time
- 55 – 65 % fuel consumption.
- Rotavator powered by tractor PTO.

### ➢ STRIP TILL DRILL

- In this machine seeds are drilled directly in a narrow tilled strip in a single pass.
- Most suitable for subsequent crops after rice/soyabean for timely planting in a single operation.

### ➢ INCLINED PLATE PLANTER

- It facilitates uniform placement of single seed in soil and therefore helps in saving of costly seed.
- Six row tractor mounted unit the field capacity is about **0.60ha/h.**

### ➢ PNEUMATIC PRECISION PLANTER

- Used to place uniform seeds, maintain fixed row spacing.
- It has provision for drilling fertilizers simultaneously with seed.

### ➢ SUAGRCANE SETT CUTTER PLANTER

- Required 45 HP tractor
- Working capacity about **0.20 ha/h.**

### ➢ RICE SEEDER

- Direct seeding of paddy in puddle soil.
- Pre germinated seeds (24 h soaking + 12 – 24h incubation) are sown in puddle soil(1-2 days after puddling)
- Normal seed rate – **50 – 70 kg/ha.**

## ➢ POTATO PLANTER

- The picker has 12 notches.
- Working capacity – **0.20 – 0.40 ha/h.**
- Tuber distance – 200 – 450 mm
- Row spacing – 600 mm
- Depth of planting – 100 – 200 mm
- Save 50 – 60 % of labour
- Saving time 80 – 85 %
- Saving cost of operation – 50 – 60 %

## ➢ Rice Transplanter

- In India mostly rice transplanting done by hand.
- About 25 – 30-man days are required for transplanting.
- Self-Propelled rice transplanter (8 row) with 3 persons transplant Working capacity – 1 ha/day, driven by **3 HP diesel engine.**

## ➢ Power weeder

- Driven by 5 HP light weight engine.
- Width Coverage is about 350mm.

## ➢ Orchard Sprayer (tractor mounted)

- Required 35 HP tractor
- Cover 0.20 to 0.50 ha/h with 3 m penetration of droplets inside plant canopy.

## ➢ Self-Propelled high clearance sprayer

- Suitable for spraying on tall crops like cotton.
- Required 20 HP diesel engine and boom fitted with 15 nozzles.
- Working capacity – 0.20 ha/h

## ➢ High capacity multi crop thresher

- Saving – 50 % labour and 50 % operational cost.

## ➢ Mechanical cotton picker

- Hand picking of cotton requires about 460 labour hour/ha
- Near about 15 % yield loss in case of insufficient labours

### ➢ Tractor mounted potato digger elevator

- Working/field capacity is about 0.15ha/h.
- With 600 mm width of cut (one row)

### ➢ Zero Tillage

- Development of zero tiilage seed/fertilizers drill at GBPAUAT pant nagar UP.
- Placed Fertilizers at depth of 7 – 10 cm.
- Blades (knife shaped) distance 2.5cm.
- In zero tillage sowing depth should be below b/w 5 – 7 cm of surface for encourage germination.
- Previous crop stubble should not be allowed to exceed 15 cm.
- Zero tillage save irrigation water by **30 – 40 %.**

## RenewableEnergy

Plant matter created by process of photosynthesis is called biomass.

The gas produced by biomass is called **biogas {methane (45 – 70 %) + Carbon dioxide}.**

### BIOGASPLANT

- **In 1937, Sri. S.V. Desai of IARI** was a pioneer man who worked on biogas**.**
- In 1952 Sri satish Chandra das gupta had studied in detail the different aspects of biogas.
- In 1964 Prof N.V. Joshi Of I.A.R.I. is of great significance.
- In 1962, Khadi and village industries commission started a project on biogas.

### TWO TYPES

1. Digester
2. Gas holder

1. **Digester**
   - below the ground level, it is made of masonry and having animal waste in foam of slum.
   - Diameter 1.2-6 meters with depth 3 - 6 meters.
   - Note - masonry is a structure built of stone or brick by a mason
2. **Gas Holder**
   - It is made of mild steel sheet
   - Contains 55% methane + 45 % $CO_2$
   - Present acid formers bacteria.

- Feeding process of slurry

Mix Cattle dung with water in the ratio of 4 5 respectively

**Dung per day**

- Buffalo – 15 kg /day
- Cow/bullock - 10 kg/day
- Calves - 5 kg/day

**Gas plant capacity**

- Size varies from 2 cubic meter to 150 cubic meters.
- Where 2 cubic meter plant requires 2 – 3 animals.
- Gas production- 0.037 $m^3$/kg of wet dung.
- 0.127 $m^3$ gas require per person per day for cooking purpose.
- For lighting purpose 0.127 $m^3$ gas per lamp of 100 candle power may be required.
- For motive power – 0.425 $m^3$ gas/hp/hour required.
- In diesel engine necessary to feed 15 – 20% of fuel with gas in engine. And 425 litters gas required per hp/hr. For a 5 HP engine, 18 $m^3$ gas may be required for 8 hours.

Note – slurry PH should be 7 – 8 in digestion chamber for gas production. Above 8 PH bacteria may be killed.

Gas production rate higher at > 35°c

Gas production rate low when temp. is < 15°C

**Calorific Value of Fuels**

| Fuel | Calorific value | Thermal efficiency |
|---|---|---|
| **L.P gas** | 27700 kcal/**$m^3$** | 60 % |
| **Petrol** | 11100 kcal/**kg** | |
| **Diesel** | 10550 kcal/**kg** | |
| **Kerosine** | 9600 kcal/**l** | 48% |
| **Coal** | 8300 kcal/**kg** | 20% |
| **Charcoal** | 7000 kcal/**kg** | 29 % |

| | | |
|---|---|---|
| **Bio gas** | 4500 kcal/**m³** | 60% |
| **Fire Wood** | 4000 kcal/**kg** | 20 % |
| **Cow dung cakes** | 2130 kcal/**kg** | **11%** |

| S. No | Name of fuel | Calorific value, kcal/kg |
|---|---|---|
| 1 | Light Diesel Oil (L.D.O) | 10300 |
| 2 | High speed diesel oil (HSD) | 10550 |
| 3 | Power kerosene | 10850 |
| 4 | Petrol | 11100 |

## Wind energy

- The minimum wind speed 10km/hr required for agricultural purpose.
- In India wind energy mainly Successful in – Karnataka, Maharashtra, Gujrat.

### GEOTHERMAL ENERGY

- On an average, the temperature of the earth increases by 300C per kilometer as one moves inward.
- The first commercial geothermal power station was erected in Larderello in Italy in 1904.
- In India, geothermal resources in the form of steam and hot water are known to exist along Ladakh and in parts of Himachal Pradesh.

### TIDAL ENERGY

- They arise twice a day.
- The first commercial tidal power station in the world, was constructed in France in 1965, across the mouth of La Rance estuary.
- In India, tidal power could probably be generated in Kutch and in Hoogly River.

### WAVE ENERGY

- Wave energy plant using OWC method is being built in Kerala.