Crop 10
Pearlmillet
Pennisetum glaucum

- Origin – Africa from where it has spread to India
- Out of 32 sp only two are known outside
  - *P. glaucum* – Pearlmillet
  - *P. purpureum* - Elephant grass – for fodder
    - Earlier *P. purpurea*
- Importance
  - Mineral rich cereal
  - Protein rich (10.5 to 14.5) with higher level of essential amino acids
  - They posses biological value similar to wheat & rice
  - It is staple food for 100 million
  - It is also a good forage crop
  - It is also grown as pasture crop
- World Area – as per 1990
  - 22.0 million ha
  - Drier region of the world
    - India & Africa (Nigeria, Niger, Mali, Chad, Tanzania, Sudan & Senegal)
  - Small areas in USA, S. America, Canada, Japan, Italy and Australia for fodder
- Indian Area – as per 1990
  - 10.6 in 1961 to 10.4 million ha in 1997
  - Predominantly in Rajasthan
    - Rajasthan 5.00
    - Maharashtra 1.67
    - Gujarat 1.21
    - UP 0.95
    - Haryana 0.50
- Ecological Zones
  - Zone I - Adequate RF & fertility
    - Punjab, UP, Delhi, Haryana, MP
  - Zone II – Limited RF heavy to light loamy soil
    - Gujarat, Maharastra & MO
  - Zone III – Low RF & light soil
    - Karnataka, N -C A.P & Rajasthan
  - Zone IV – Limited but well distributed RF
    - TN & Coastal A.P
- It is warm weather annual plant
- Root system like sorghum
  - Seminal, adventitious and prop roots
- Drought withstanding mechanism
Deeper root system
Efficient photosynthetic system
Rapid transfer of food materials from leaves to grain

- Leaf sheaths are open & hairy
- Leaf blades are flat
- Stigma comes out several days before the anthers appear
- The anthers emerge after the style dry
- As a rule highly cross-pollinated crop

Climate
- Rainfall of 400-750mm
- Mostly Arid & Semi-Arid regions
- For vegetative growth moist weather & medium RF is sufficient
- Temp are 28 to 32º C is optimum for vegetative growth
- Higher temp at this stage induces early flowering
- Pearl millet does not resist drought but cut shorts its life cycle and comes flowering early under adverse conditions
- Rainfall during flowering & grain formation– poor grain setting
- Rain at grain maturity – ergot disease due to high humidity & low temp.
- Hence optimum time of sowing is very vital for this crop

Many improved Hybrids & good open pollinated varieties
- In TN
  - X 6, X 7, CO 7, WCC 75(World Cumbu Composite)
  - COH 8, K 3 etc
  - CO 9 is a good fodder variety. Its combination with CO 5 cowpea is a specialty
- Some identified varieties for north
  - Pusa 23 (MH 169), Pusa 322, ICMH 451, ICHM 356
  - HHB 60, 67, 68, 50
  - RHB 30, 90
  - MH 605 (Pusa 605), MH 790, MH 782

Soil
- Loamy sands to loams, well drained, non saline and non-alkaline are more suitable
- Sensitive to water logged areas

Field preparation
- Moisture conservation practices, summer ploughing, deep tillage once in three years, are essential
- Fine and smooth seed bed free from clods
- Free of termites and ants

Sowing
- Optimum time plays vital
- Delay in sowing leads to disease and reduced grain yield
- Mid July is more suitable – onset of monsoon in Rajasthan
- In TN it is sown in two monsoons Jun-July and Sep-Oct and also in summer
Seed treatment is important

- Seed rate
  - 4-5 kg if sown behind country plough
  - 3.75kg for nursery cum transplanting
    - Transplanting is suitable for delayed sowing
    - 500 m-2 nursery
    - 15-18 days old seedlings
  - Optimum population
    - 175,000 to 200,000
    - 45 cm row for certain varieties it may be less than 45 (Co 7)
    - In between plants – it is decided after thinning
    - It may be by ‘inter-ploughing’
    - For irrigated crops 15 cm between plants may be given

- Weed management
  - Manual weeding is costly affair
  - Hence inter-cultural operation with machinery is more useful to reduce the weed and also plant density
  - To increase tillering thinning is must
  - Herbicides pre-emergence
    - Atrazine 0.25 kg
    - Pendimethalin if intercropped with pulses
  - In addition a manual weeding can also be

- Nutrient management
  - Compared to sorghum and maize N & P removal is less but K is high
  - Fertilizer schedule
    - May be based on soil test
    - Irrigated
      - Hybrids : 80:40:40
      - Varieties : 70:35:35
    - Rainfed
      - Low rainfall : 40:30:30
      - Moderate to high : 60-80:40:40
        - N in 2 splits and P & K as basal
  - N may be at basal and 15DAT / 30DAS
  - Higher N application needs balanced P also
  - Micro-nutrients
    - Zn 25 kg
    - Fe 12-5 to 25.0 kg for deficient soils
  - FYM 5t
  - Bio-fertilizers seed and main field application
    - Azospirillum & azotobacter
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**Water management**
- Highly drought evading crop
- Requires much lower water than any cereals
  - 250-350mm is sufficient
- Utilization of rain water depends on
  - Type of soil
  - Organic matter content and
  - Leveling of the field
- Though it is rainfed crop this crop requires moisture at anthesis & flowering stages
- 3-4 irrigations is more than sufficient to get good yield

**Moisture conservation practices to pearl millet cultivation**
- Deep ploughing once & 3-4 ploughing before sowing
- Ridges and furrow system
- Application of FYM 5t/ha
- Uses of mulches to reduce ‘E’
- Uses anti-transpiration materials – like kaolin. PMA, Atrazine
- Seed treatment
- Removal of 1/3 upper part of the seedlings to minimize ‘T’
- Mid-season correction if drought occurs
- Appropriate weed control measures
- Intercropping with legumes etc

**Cropping systems**
- Mostly single crop per annum in Rajasthan
- Since mono-cropping is not advisable alternating with legumes
- In more rainfall areas it is followed with a Rabi crop
  - Rabi crops are winter cereals
  - Intercropping is also possible in these areas with pulses and oilseeds

**Harvesting and grain quality**
- At physiological or when the grain moisture is 15-20%
- The ear heads are separated and dried and threshed
- Threshed grains should be dried to 12-14% moisture

**Grain yield**
- Irrigated 3.0 to 3.5 t
- Rainfed 1.2 to 1.5t/ha

**Use of nitrogenous fertilizers helps to realize protein potential**