



Roughage sources – Green and Dry roughage

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Green roughages

- ✓ Easily digestible
(when harvested at proper time)
- ✓ More palatable
- ✓ Slightly laxative
- ✓ Animals yielding 8 - 10 litres of milk can easily be maintained solely on green fodder

Nutrient	%
Crude protein content	
Young forage	25-30
Mature forage	2-3
Soluble carbohydrate	4 -30
Cellulose	20 -30
Hemicellulose	10 -30



Green roughages

▶ Non – Leguminous

Cereal fodders

- ▶ Maize fodder crop
- ▶ Sorghum fodder crop

Grass fodder

- ▶ Hybrid Napier – bajra
- ▶ Guinea grass
- ▶ Anjan grass

▶ Leguminous

- ▶ Desmanthus
- ▶ Stylosanthes
- ▶ Lucerne
- ▶ Cow pea



Cereal Fodder crop - Maize

- ▶ **Harvested at 60 to 70 days**
Biomass Yield range from
350 - 450 quintals / hectare

Nutrient	%
Crude Protein	8 - 10
TDN	60.00
Crude fibre	27.20
Ether extract	0.90





Cereal Fodder crop - Sorghum

- ▶ Harvest – first cut – 75 - 80 days subsequent harvest once in 50 days
- ▶ Biomass yield range from 190 ton / hectare (6 - 7 cuts)
- ▶ 50 cm ht sorghum crop
- Contains **Cyanogenic glycosides** leading to prussic acid poisoning
- ▶ **Ruminants more susceptible** because rumen microbes metabolize cyanogens producing prussic acid.
- ▶ **Monogastric – acidic pH**
– destroy enzyme which help in converting cyanogen to prussic acid.



Nutrient	%
Crude Protein	4 -5
TDN	58.0
Calcium	0.5
Phosphorous	0.2



Grass Fodder crop – Hybrid Napier bajra

- ▶ Perennial grass fodder
- ▶ Cross between Bajra and Napier grass
- ▶ Harvest – first cut - 75 days subsequent cut once in 45 days
- ▶ Yield – 160 -180 tons / acre at 7 – 8 cuts
- ▶ Intercropped with Desmanthus at 3:1 ration – harvested together and fed to animals



Nutrient	%
Crude Protein	8 - 12
TDN	55 - 58
Crude fiber	26 -28



Grass Fodder crop – Guinea grass / Panicum maximum

- ▶ Perennial grass fodder
- ▶ Tall (1.0 – 4.5 m ht), densely tufted with numerous shoots.
- ▶ First harvest at 75-80th day
- ▶ Yield – 175 tons / ha in 8 cuttings
- ▶ Intercropped with Hedge lucerne at 3:1 ration – harvested together and fed to animals



Nutrient	%
Crude Protein	4 – 14
TDN	55 - 58
Crude fiber	31



Grass Fodder crop – Anjan grass / Buffel / African foxtail / Cenchrus

- ▶ Perennial grass fodder
- ▶ It withstands drought and excellent grazing grass for hot dry areas
- ▶ Harvest - 70 – 75th day after sowing
- ▶ Yield – 40 tons / ha / year in 4-6 cuts
- ▶ Relished by all classes of livestock
- ▶ Good soil binder and used as a cover crop on bunds for soil and water conservation



Nutrient	%
Crude Protein	4.9
TDN	55 – 58
Crude fiber	32.9



Leguminous Fodder crop – Desmanthus / Hedge Lucerne

- ▶ Harvest – first cut 90 days
subsequent cut once in 40 - 45 days
- ▶ Yield – 40 ton / acre / year in 6 cutting

Nutrient	%
DCP	19.2
TDN	59.79



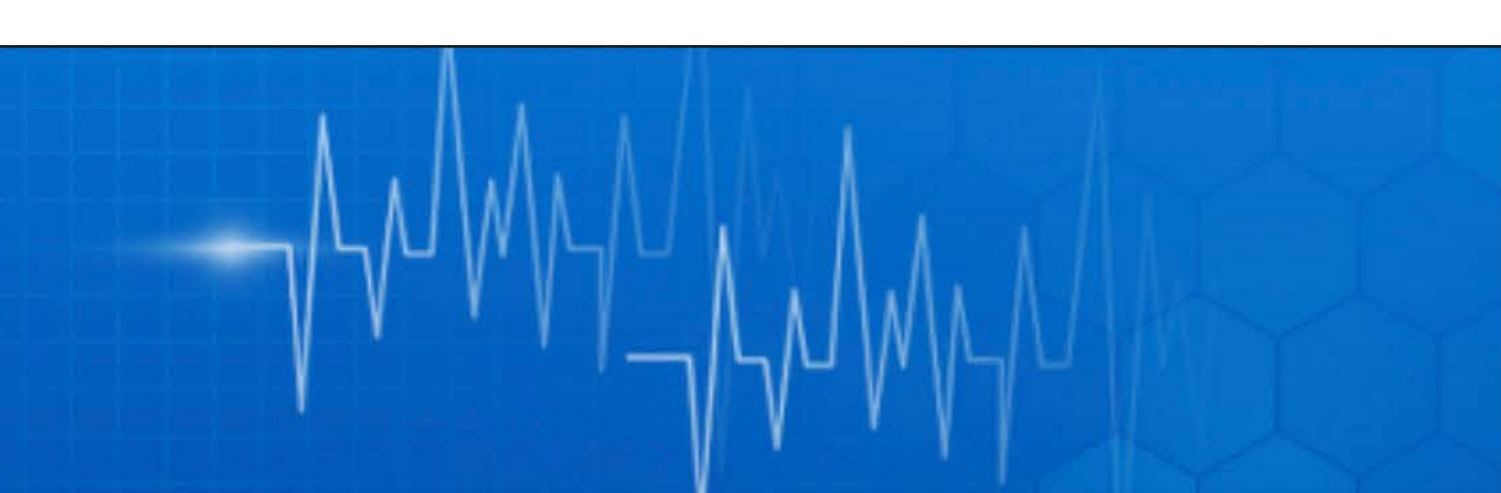


Leguminous Fodder crop – Lucerne

- ▶ Queen of forages - Deep rooted perennial forage legume
- ▶ Harvest – first cut 75 – 80 days subsequent cut once in 25 -30 days
- ▶ 1st yr –70 -80 tons / ha / year in 10 harvest
- ▶ Contains saponins – early morning feed in ruminants leads to frothy bloat



Nutrient	%	Nutrient	%
Crude Protein	18 - 22	Ca	2 -3
Crude fiber	25 - 35	P	0.23



Leguminous Fodder crop – Berseem

- ▶ It is the King of fodders due to more no. of cuts and high nutrition value
- ▶ Harvest – first cut 55 – 60 days subsequent cut once in 30 days
- ▶ 1st yr – 500 – 600 Quintals / ha / year in 5 - 6 harvest
- ▶ Known as milk multiplier
- ▶ Feed after wilting to avoid bloat to animals



Nutrient	%	Nutrient	%
Crude Protein	17	TDN	60 - 65
Crude fiber	25.9	P	



Leguminous Fodder crop – Stylosanthes

- ▶ Drought resistant legumes
- ▶ Tolerant to low fertility soils
acidic soils
- ▶ Harvest – first cut 75 days
subsequent cut depends
on growth
- ▶ 1st yr – yield is low
- ▶ 3rd yr – 30 -35 tons / ha / yr
established after self seeding
- ▶ Good pasture legumes
- ▶ CP – 13.9 % , CF – 25.28 % ,
Ca – 2.11 % , P – 0.44 %





Leguminous fodder - Cowpea

- ▶ Harvest – 50 - 55 days
(55 % flowering)
- ▶ Yield – 25 -28 tons / hectare
- ▶ Used for
 - green feeding,
 - hay making
 - ensiling with maize / sorghum



Nutrient	%	Nutrient	%
Crude Protein	21.56	TDN	59.0
Crude fiber	26.7	Calcium	1.40
Ether extract	3	Phosphorus	0.35



Dry roughages

▶ Farmers are using dry roughages because of **inadequate supply of green fodder**

▶ Used as energy feed (40 -50% digestible energy)

▶ Voluntary intake is low – meets only maintenance needs

▶ **Poor nutritive value due to**

- Strong chemical bond between lignin and cellulose / hemicellulose
- Highly deficient in protein, fatty acids, minerals and vitamins
- High silica – depress organic matter digestibility



Dry roughage – Hay

- ▶ Green crops conserved as hay by reducing moisture content to 15 – 20 %
(It inhibits enzyme and microbial action)

- ▶ Leguminous hay – high protein and vitamin A, E and D content
- ▶ Lucerne, cowpea, soyabean hay
- ▶ Non leguminous hay – grasses
- ▶ Oats and barley – harvested at milk stage
- ▶ Mixed hay – mixed crops of legumes and non legumes





Dry roughage – Cereal straw

- ▶ paddy straw, wheat straw
- ▶ Available after harvesting the grains
- ▶ **High oxalic acid content**
– limits calcium absorption

Nutrient	%
Crude Protein	3
TDN	40 -45





Dry roughage – Pulse straw

- ▶ Husk of the pods with leaves and tender stems
- ▶ Straws of Urad, moong and moth – highly palatable
- ▶ **High oxalic acid content** – **limits calcium** absorption

Nutrient	%
Crude Protein	10
TDN	40 -45





Dry roughage – Ground nut straw

- ▶ After harvesting ground nut, available leaves and stem is groundnut bhusa
- ▶ **DCP content superior than cowpea hay**

Nutrient	%
Crude Protein	4 - 6
Crude fibre	51





Dry roughage – Stover and husk

- ▶ **Stover – mature cured stalks from grain crop after the grain is removed**
 - ▶ maize stover
 - ▶ Sorghum stover

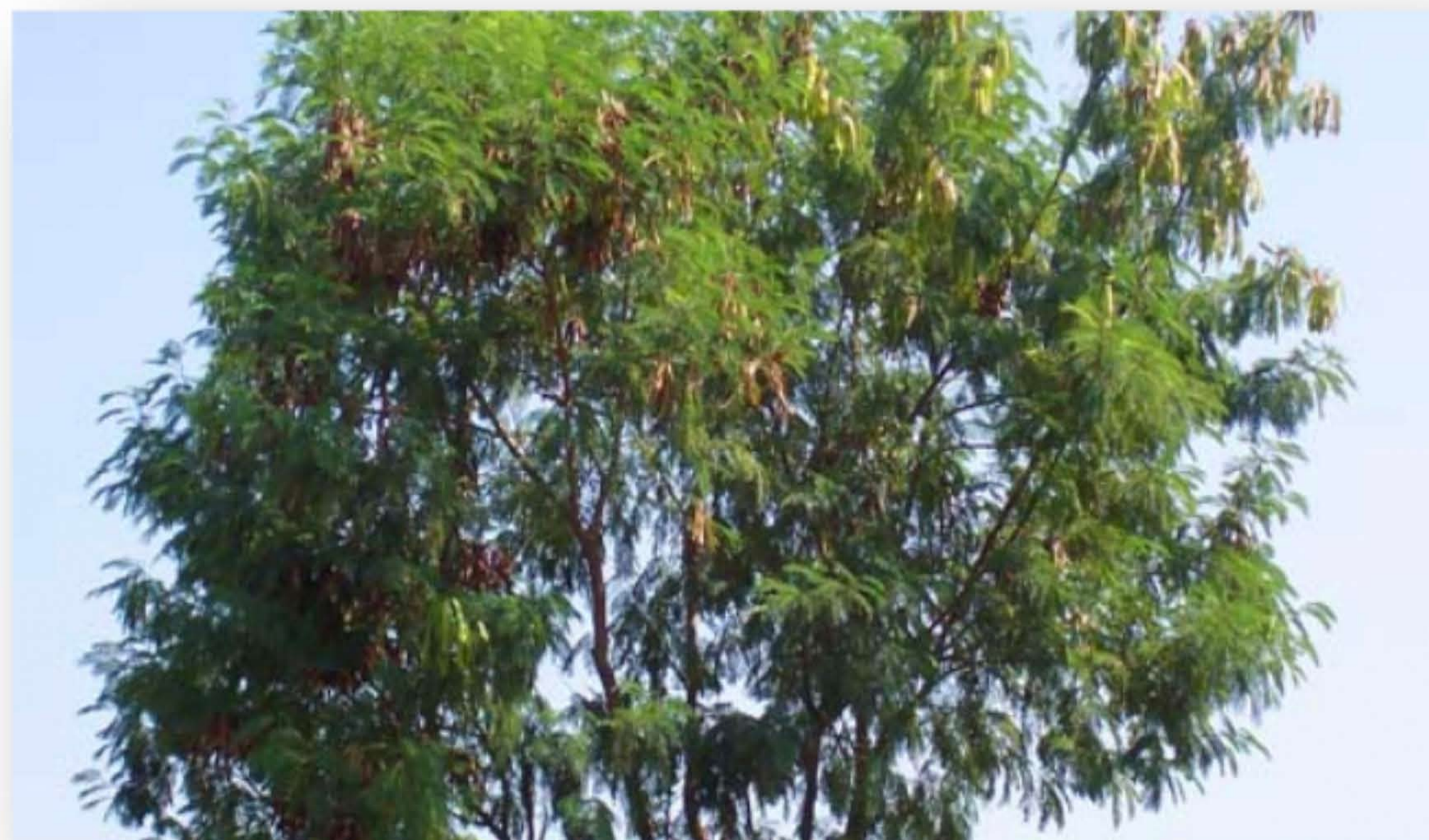


- ▶ **Rice Husk – outer covering of the grain removed during milling process**
 - ▶ Low nutritive value
 - ▶ Irritate digestive tract
 - ▶ CP – 2.9 -3.6 %
 - ▶ CF – 39 -42 %
 - ▶ Ash – 15 -22 %



Tree leaves - *Leucaena leucocephala*

- ▶ Harvested at 6 - 9 months after sowing when it attains 5-10 cm above ground level
- ▶ CP – 25.00 %, CF – 22.00 %
- ▶ Leaf meal contain riboflavin, vitamin K and xanthophyll



- ▶ **Toxic to pigs and horse** because of presence of toxic amino acids mimosine (3.0 %)
- ▶ Mimosine metabolite 3 –hydroxyl – 4 – pyridine have **amniotic and goitrogenic activity**
- ▶ Heifers fed with leucaena after mating
- ▶ **decreased conception**
- ▶ If giving birth – calves having goiter



Tree leaves - Glyricidia

- ▶ **Glyricidia sepium** is fast growing, leguminous, thornless tree
- ▶ It is a source of fodder and substitute for *Leucaena leucocephala*
- ▶ Sows – 25 % of total feed and cattle – 50 % of total feed – no detrimental side effects were observed



Nutrient	%
Crude Protein	18.00
Crude fiber	20.00
Ether extract	4.00



Tree fodders - Sesbania sp

- ▶ It is a leguminous tree fodder
- ▶ Very good protein source
- ▶ No anti-nutritional factors
- ▶ Very good forage source for cattle and small ruminants



Nutrient	%
Crude Protein	25 - 30
Crude fiber	10.9
Ether extract	3.68



Conclusion

- ▶ Green fodder is easily digestible and highly palatable.
- ▶ Types of green fodder available is
 - ▶ **Cereal fodder crops** – maize fodder crops, sorghum fodder crop
 - ▶ **Grass fodder crops** – Hybrid Napier Bajra cross, Guinea grass, Anjan grass
 - ▶ **Leguminous fodder crop** – Desmanthus, Lucerne, Berseem, cowpea
- ▶ Dry fodder is a poor protein source with high energy
- ▶ Paddy straw, Sorghum stover, Groundnut haulms are some of the examples of dry fodder
- ▶ Understanding fodder resources will help the stake holders in formulating ideal feeding regimen for livestock



Thank you