Tropical Feed Production : Forage crop

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Content

- Definition of forage crops
- Importance of forage crops
- Important forage crop varieties
- Forage crop plot management

What are forage crops ?

Plants that animals intake and are beneficial to their body, and are not toxic.

GRASS

Family: Gramineae (Poaceae)

LEGUME

Family: Leguminosae (Fabaceae)

The importance of forage crops

1.Used as animal feed

2.Prevented soil erosion

3. Increased soil fertility

Site and Species Selection

- **Choosing the Right Forage:**
  - **Climate:** Consider rainfall and temperature patterns.
  - **Soil Type:** Match species to your soil's pH and fertility.
  - **Animal Type:** Different forages suit different animals (cattle, goats, sheep).
  - **Intended Use:** Grazing, hay, or silage.
- **Key Considerations:** Nutritional value (protein, energy) and disease resistance.

Types of Tropical Forage in Thailand

Tropical Grasses

Tropical Legumes

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RUZI GRASS

Scientific Name: ***Urochloa ruziziensis***

Synonyms ***: Brachiaria ruziziensis***

Origin: Democratic Republic of the Congo, Rwanda

General characteristic

- This is a perennial grass with a semi-erect, semi-prostrate growth habit.
- It grows quickly, tillers well, and has high palatability due to its soft leaves.
- It also develops roots at its nodes.
- It thrives in an upland area with well-drained soil.
- It can stand moderately heavy grazing.
- It is moderately drought-tolerant, not flood-tolerant.

Propagation: By seed (seed rate 2 Kg/rai)

Yield :

- Fresh weight 8-10 ton/rai/yr (50-62.50 ton/ha/yr)
- Dry weight 2 - 2.5 ton/rai/yr (12.50-15.63 ton/ha/yr)
- CP 7-10 %

Strengths : Resistant to animal trampling

Weaknesses: Dormant during droughts

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Purple guinea grass

Scientific name : *Megathyrsus maximus*

Synonym : *Panicum maximum* TD58

Origin : Africa

General characteristic

- It is a perennial grass with an erect, clumping growth habit.
- It tillers well, has large, soft, and abundant leaves.
- It can grow in shady conditions.
- It is suitable for planting in irrigated areas or where water is available.
- It prefers well-drained soil with moderate fertility.

Propagation : By seed (seed rate 2 Kg/rai)

Yield:

- Fresh weight 10-14 ton/rai/yr (62.50-87.50 ton/ha/yr)
- Dry weight 2.5-3.5ton/rai/yr (15.62-21.87 ton//ha/yr)
- CP 7-10 %

Strengths:

Shade tolerance

Soft, dense leaves

Weaknesses:

High humidity conditions are prone to leaf blight and ergot disease.

Not water-logged and not suitable for sandy soils.

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Guinea mombasa grass

Scientific name : *Megathyrsus maximus* cv. Mombasa

Synonym: *Panicum maximum* cv. Mombasa

Origin: South America

General characteristic

- It is a perennial grass with upright, tillering, and dense growth habit.
- The stems are 2.5-3 meters tall.
- It is resistant to leaf blight.
- It can be grown all over the country, except in areas with highly acidic soil.
- It prefers well-drained soil with moderate fertility.
- It is highly tolerant of shady conditions.

Propagation : By seed (seed rate 2 Kg/rai)

Yield:

- Fresh weight 16-20 ton/rai/yr (100-125 ton/ha/yr)
- Dry weight 4-5 ton/rai/yr (25-31.25 ton/ha/yr)
- CP 8-10 %

Strengths:

Tolerates shade well
Tender leaves with abundant foliage
Drought and cold tolerance
Resistant to leaf blight

Weaknesses:

Not resistant to standing water
Not resistant to heavy grazing

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Atratum, Ubon paspalum

Scientific name : *Paspalum atratum*

Origin : Brazil

General characteristic

- It is a perennial grass with large, upright clumps, a leafy upright.
- It has wide, lanceolate leaves, sharp leaf edges, tillers well, and grows to about 1 meter tall.
- It is tolerant of acidic soil conditions.
- It is tolerant of waterlogging and can grow well in moist and wet areas.

Propagation : By seeds (seed rate 2 Kg/rai)

Yield:

- Fresh weight 10-14 ton/rai/yr (62.50-87.50 ton/ha/yr)
- Dry weight 2.5-3.5 ton/rai/yr (15.63-21.88 ton/ha/yr)
- CP 7-8 %

Strengths

Grows well in almost all soil types.
Tolerates drought and flooding.

Weaknesses

Leaves are rather rough with sharp edges.
Not suitable for growing in shady areas.

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Plicatulum, Ya-phlikhathiulum
Scientific name: ***Paspalum plicatulum***
Origin: Brazil

General characteristic

- It is a perennial grass with large, upright clumps, but smaller than those of Atratum grass.
- It has lanceolate leaf margins and is low in palatability.
- It can grow well in sandy soil with low fertility.
- It is tolerant of lateritic soil and dry conditions.
- Very tolerant of short-term flooding and waterlogging.

Propagation : By seeds (seed rate 2 Kg/rai)

Yield:

- Fresh weight 6-8 ton/rai/yr (37.50-50 ton/ha/yr)
- Dry weight 1.5-2 ton/rai/yr (9.38-12.50 ton/ha/yr)
- CP 7-8 %

Strengths:
Grows well in almost all soil types
Drought and flood-tolerant.

Weaknesses:
Sharp leaves
Not suitable for growing in shady areas.

Napier grass

Scientific name: *Cenchrus purpureus*

Synonym: *Pennisetum purpureum*

General characteristic

- It is a fast-growing perennial grass with an upright, clumping growth habit, reaching a maximum height of about 4 meters.
- It tillers well and has a strong root system.
- It prefers well-drained soil with high fertility and is suitable for planting in irrigated areas
- Prefer full sun
- Not tolerant of waterlogging or heavy grazing by animals.
- Yields throughout the year & Suitable for silage making

Propagation : By tillers that are approximately 90 days.

The planting rate is 300-500 Kg/rai

Yield:

- Fresh weight 35-40 ton/rai/yr (218-250 ton/ha/yr)
- Dry weight 7-8 ton/rai/yr (43.75-50 ton/ha/yr)
- CP 8-10 %

Strengths:

High yield

Suitable for fermentation.

Weaknesses

-The plant must be chopped or cut to prevent selective leaf feeding.

-The plant must be cut close to the ground to ensure good tillering of new plants.

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Pangola grass , Common finger grass
Scientific name: ***Digitaria eriantha***
Origin : Africa

General characteristic

- It is a perennial grass with an erect-to-creeping growth habit.
- The stems are small and hairless, and the leaves are small and thin.
- It tillers well, and the stems creep along the ground, rooting and producing tillers at the nodes.
- The tender stems grow upright as they get older.
- The stems creep along the ground.
- It is tolerant of seasonal waterlogging.
- It can grow well in highly fertile soil.

Strengths:
High leaf-to-plant ratio,
Soft leaves
Suitable for Hay.

Propagation : By tillers that are approximately 50-60 days.
The planting rate is 250-300 kg/rai

Yield:

- Fresh weight 16-20 ton/rai/yr (100-125 ton/ha/yr)
- Dry weight 4-5 ton/rai/yr (25-31.25 ton/ha/yr)
- CP 7-10 %

Weaknesses:
Not resistant to flooding for more than two weeks.

Humidicola, Creeping signal grass

Scientific name: ***Urochloa humidicola***
Synonym : ***Brachiaria humidicola***
Origin**: East Africa and South Africa**

General characteristic

- It is a perennial grass with a dense, creeping stem and roots at the nodes.
- Tolerant to grazing by animals.
- Grows well in many types of soil.
- Tolerant of drought, and reasonably tolerant to waterlogging.
- Suitable for planting on sloping areas to prevent erosion or topsoil runoff.

Propagation : By stolon or rooting branches, with a planting rate of 300-500 kg/rai

Yield:

- Fresh weight 8-12 ton/rai/yr (50-75 ton/ha/yr)
- Dry weight 2-3 ton/rai/yr (12.50-18.75 ton/ha/yr)
- CP 8 %

Strengths

Grows well in almost all soil types.
Drought and wet soil tolerance.
Resistant to trampling.

Weaknesses:

Not resistant to extreme cold conditions

Whip grass
Scientific name: *Hemarthria compressa*
Origin : Thailand

General characteristic

- It is a perennial plant with a creeping stem that covers the ground.
- The tip stands up 90-120 cm. The leaves are smooth and hairless.
- It has underground stems or rhizomes, and above-ground stems or stolon that root at the node touching the ground.
- Young stems are purple-red and turn green with age
- Tolerant to waterlogging.

Propagation : By stem cutting or underground stems that are more than 60 days.
The planting rate is 350-400 Kg/rai/yr

Yield:

- Fresh weight 12-18 ton/rai/yr (75-112.5 ton/ha/yr)
- Dry weight 3.4-5 ton/rai/yr (21.25-31.25 ton/ha/yr)
- CP 9-10 %

Strengths:
Tolerates flooding for longer periods than other types.

Weaknesses:
The trunk dries slowly.
Found only in the southern region in Thailand.

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Nile grass

Scientific name:*Acroceras macrum*

Origin : South Africa

General characteristic

- It is a perennial plant which upright to spreading habit.
- The stem is slender and the leaves are dark green.
- The leaf surface is smooth or has a few small hairs.
- It grows about 40 – 110 cm.
- Hight palatability
- Suited to wet or seasonally flooded

Propagation : By rhizome and stolon that are approximate 50-60 days. The planting rate is 300-400 Kg/rai/yr

Yield :

- Fresh weight 10-12 ton/rai/yr (62.5-75 ton/ha/yr)
- Dry weight 2.5-3 ton/rai/yr (15.63-18.75 ton/ha/yr)
- CP 11 %

Strengths:
Resistant to seasonal flooding

Weaknesses:
Not drought tolerant

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Leucaena

Scientific name : *Leucaena leucocephala* cv. K636

Origin : South America/ Central America and the Pacific Islands

General characteristic

- It is a perennial plant that can live for many years and be grown in tropical climates.
- It has a high nutritional value.
- It can produce yield during dry seasons because it has a deep root system.
- It can grow well in nutrient-rich soil with good water drainage.
- It is a fast-growing plant that is drought-tolerant and adaptable to high-moisture areas.

Propagation : Using seeds 1-2 Kg/rai.

Before planting, soak the seeds in water for 1 night before planting

Yield:

- Total weight of leaves including fresh branches 4.8-6 ton/rai/yr (30-37.50 ton/ha/yr)
- Total weight of leaves including dry branches 1.2-1.5 ton/rai/yr (7.5-9.38 ton/ha/yr)
- CP24 %

Strength:

-All parts of the stem are usable.

-The K636 variety is resistant to pheasant aphid infestation.

Weaknesses:

-Not tolerant to highly acidic soils.

-Contains the toxic substance mimosine.

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Desmanthus
Scientific name: *Desmanthus virgatus*
Origin : South America Central America

General characteristic

- It is a perennial legume with a rather upright shrub-like appearance. It grows approximately 2-3.5 meters tall.
- Its leaves and flowers resemble those of the Acacia, but are smaller.
- It thrives in clay loam soils with relatively high fertility.
- Areas with well-distributed rainfall and irrigation.
- It is not tolerant of flooding, very acidic soils, or drought.

Propagation : By seed (seed rate 2 Kg/ rai.)

Before planting, soak the seeds in hot water at 80 ◦ C for 5 minutes.

Yield:

- Fresh weight 8-12 ton/rai/yr (50-75 ton/ha/yr)
- Dry weight 2-3 ton/rai/yr (12.5-18.75 ton/ha/yr)
- CP 16-18 %

Strengths:
Cut-resistant
Non-toxic

Weaknesses:
During the late rainy season, thrips and whiteflies are found, causing the shoots to curl.
-Black fungus is also found, causing the shoots to wilt.
-Leaf fall.

Centurion, Centro, Thua cavalcade (Thai)

Scientific name: ***Centrosema pascuorum*** **cv. Cavalcade**

Origin : South America

General characteristic

- An annual with a creeping growth pattern.
- It has dense foliage, with a greater proportion of leaves than stems.
- The stems and petioles are hairless.
- When dry, the leaves do not easily fall off, It makes excellent hay.
- It thrives in a variety of soils, from sandy to clay.
- It thrives in high, non-flooded areas.
- It flowers and bears seeds in November.

Propagation : By seed (seed rate 4 Kg/rai.)

Yield:

- Fresh weight 3-4 ton/rai/yr (18.75-25 ton/ha/yr)
- Dry weight 1 ton/rai/yr (6.25 ton/ha/yr)
- CP 14-18 %

Strengths:

Leaves do not fall off when dried.

There are many leaves.

Weaknesses:

It is a seasonal plant.

Thapra stylo
Scientific name : *Stylosanthes guianensis* var. *guianensis*
Origin : South America, Central America

General characteristic

- This 2-3-year-old Thapra stylo has an upright, densely leafy bush.
- The plant and bush are larger than those of Hamata, and the stems are more plump than those of Hamata.
- Suitable for growing in high-lying areas, it thrives in sandy soils with low fertility, and in soils that are slightly acidic to clayey.
- High yields in sandy loam soils.
- It tolerates acidic soils.
- It is not tolerant of saline and alkaline soils (pH greater than 8.5)
- It does not tolerate frequent grazing, trampling, or cutting.

Propagation : By seed (seed rate 2 Kg/rai.)

Before planting, soak the seeds in hot water at 80 ◦ C for 5- 10 minutes.

Yield:

- Fresh weight 6-10 ton/rai/yr (37.5-62.5 ton/ha/yr)
- Dry weight 1.5-2.5 ton/rai/yr (9.38-15.63 ton/ha/yr)
- CP 16-20 %

Strengths:

Drought and wet soil tolerance

Anthracnose resistance

Weaknesses:

High yield at the first cut only.

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Verano stylo, Thua hamata, Caribbean stylo

Scientific name: *Stylosanthes hamata* cv. Verano

Origin : West Indies, Central America, South America

General characteristic

- It is a herbaceous perennial or short-lived tree, 75 cm tall, with an erect or slightly erect habit.
- It has a short, upright bush with spreading branches that cover a wide area.

Propagation :By seed (seed rate 2 Kg/rai.)

Before planting, soak the seeds in hot water at 80◦C for 5-10 minutes.

- Yield:
  - Fresh weight 6-8 ton/rai/yr (37.5-50 ton/ha/yr)
  - Dry weight 1.5-2 ton/rai/yr (9.38-12.50 ton/ha/yr)
  - CP 16-18 %

Strengths:
It is drought-tolerant and acidic.
Tolerant to grazing and animal trampling well.

Weaknesses:
High yield only on the first cut.
Not tolerate of wet soil or flooded soil and shade.

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Amarillo, Pinto peanut

Scientific name: *Arachis pintoi* cv. Amarillo

Origin : South America

General characteristic

- It is a perennial plant.
- Grows well in moderately fertile and highly moist soil.
- Grows well in many types of soil with good drainage
- The creeping stems form a dense cover on the ground.
- Has high nutritional value and palatability, making it suitable for use as animal feed, either by allowing animals to graze or by cutting and making into high–quality hay.
- Used to prevent soil erosion.

Propagation: By stolon planting rate 400-500 Kg/rai or

by using seeds (produces few seeds) at a rate of 2 Kg/rai

Yield:

- Fresh weight 4 - 8 ton/rai/yr (25-50 ton/ha/yr)
- Dry weight 1.0 - 2.0 ton/rai/yr (6.25-12.5 ton/ha/yr)
- CP 15-20 %

Strengths:

Tolerant to drought, shade, and grazing and trampling by animals

Propagates using stem segments and seeds.

Weaknesses:

Few seeds are produced.

Difficult to harvest seeds.

Florigraze, Rhizome peanut

Scientific:*Arachis glabrata* cv. Florigraze

Origin : It was created by crossing between different species in experimental fields at the University of Florida, USA.

General characteristic

- This perennial bean has a short, dense, creeping runner that covers the ground.
- It has numerous underground stems that provide excellent ground cover and do not set seeds.
- It thrives in a variety of well-drained soils.
- It thrives in low-fertility soils and is drought-tolerant.
- It tolerates shade and is highly resistant to grazing and trampling.
- It can be used to prevent soil erosion.

Propagation : underground stems called "rhizomes." with planting rate: 400-500 kilograms per rai.

Yield:

- Fresh weight 6 -10 ton/rai/yr (37.5-62.5 ton/ha/yr)
- Dry weight 1.5-2.5 ton/rai/yr (9.38-15.63 ton/ha/yr)
- CP 15-20 %

Strengths:
Drought-resistant, powdery mildew-resistant

Weaknesses:
Does not set seeds;
uses underground stems (rhizomes) for propagation.

Other plant used for animal feed

- Corn
- Green Cassava leaves
- Mulberry

Corn, Maize

Scientific name : *Zea may* L.

General characteristic

- Straight stem, single leaves.
- Prefers well-drained soil with moderate fertility.
- The planting site should be upland or protected from flooding.
- Soil pH between 5.5 and 7.0 Organic matter content greater than 1%

Propagation: By seed which planting rate depends on the variety.

Yield:

- Fresh weight 6-8 tons/rai/production cycle (37.5-50ton/ha/ production cycle) depending on the variety.

Strengths:
Hight nutrient value

Weaknesses
Downy mildew, Fall Armyworm

Cassava
Scientific name: *Manihot esculenta* Crantz

General characteristic

- This small, perennial shrub is easy to grow and drought-resistant.
- The trunk is erect, approximately 2-4 meters tall, and 3-6 cm in diameter.
- It is vigorous, with dense buds and a fairly large size.

Propagation : by cuttings

Use fresh cuttings that are 10-12 months old
(cut and leave them for no more than 15 days)
Cuts are 20-30 cm long (with at least 5 buds)

Yield:

- Productivity collect green cassava leaves and branches.
- Cut the green tops down to approximately 30-60 cm.
- The green leaves and petioles, combined with the branches, yield approximately 600-800 kg/rai (fresh leaves)or 3.75 -5 ton/ha/yr
- Depending on soil management and fertility.

First harvest after planting
at least 4 months old

Strengths:
Easy to grow, both leaves and bulbs can be used.

Weaknesses
Fresh leaves contain the toxic substance hydrocyanic acid (HCN).

Mulberry
Scientific name: *Morus alba* Linn
Origin: China

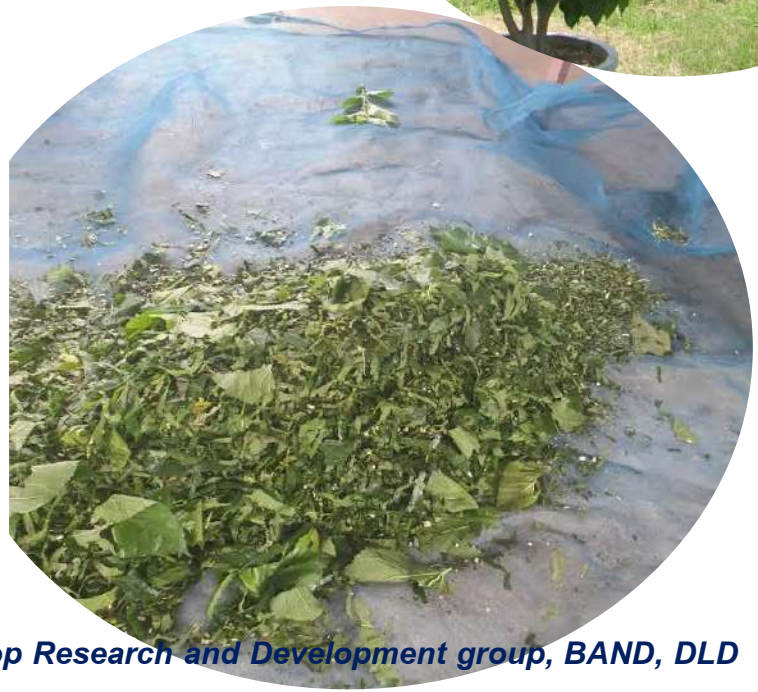
Genaral Charecteristic

- It is a medium-sized shrub, approximately 2-5 meters tall.
- It is perennial.
- The planting area should be well-drained and free from flooding.
- It thrives in sandy loamy soil, loose and deep topsoil.
- The soil is neither too acidic nor too alkaline, with a pH between 6.0 and 6.5
- The area should be able to provide adequate water.

Propagation: using cuttings 4 months to 1 year old (cuttings 15 - 20 cm. long).

Yield:

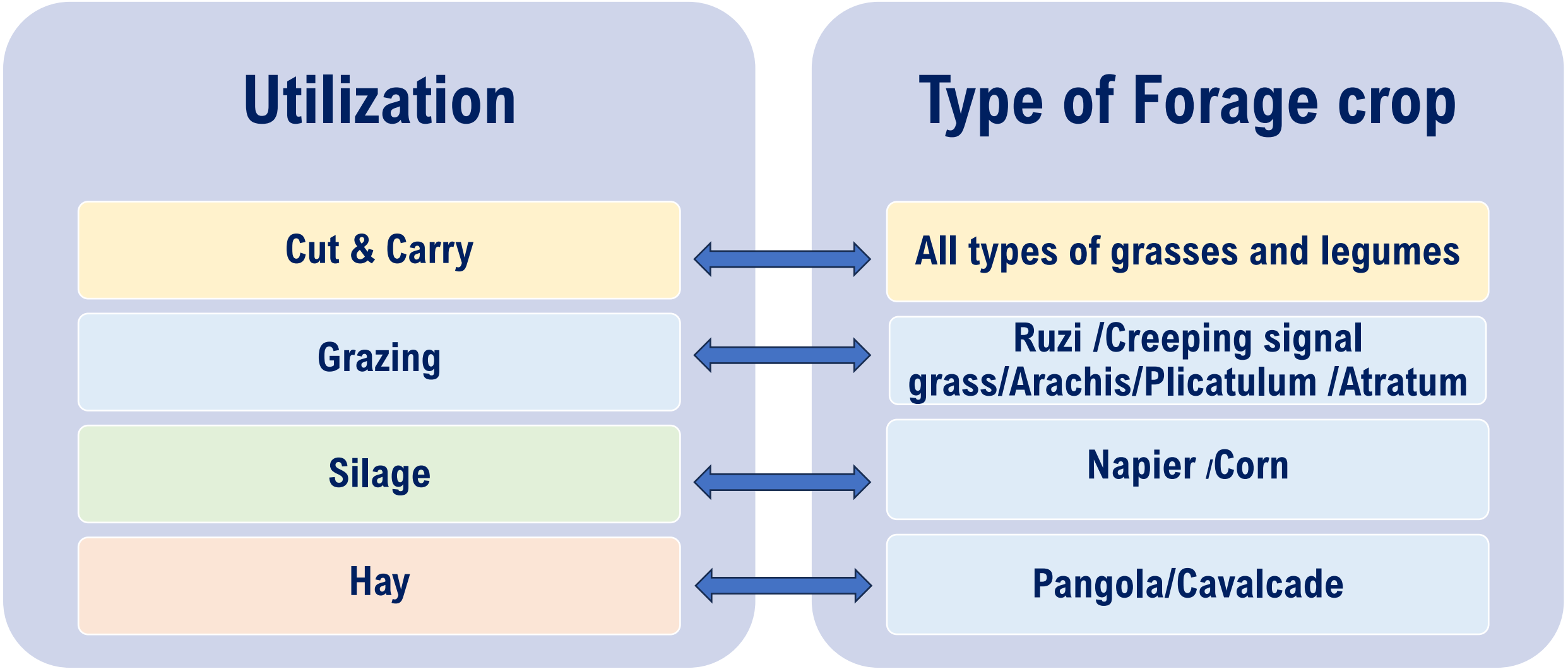
- Fresh weight of leaves and branches: 4-8 tons/rai/yr (25 - 50 tons/ha/yr)
- Dry weight of leaves and branches: 1-2 tons /rai/yr. (6.25 -12.5 tons/ha/yr)
- CP 16 %.



Strengths:
Easy to grow
Contains antioxidants

Weaknesses:
Low yield

Selecting the type of Forage crop for Utilization



Establishment and Management

- **Land Preparation:**
  - Plowing and harrowing to create a fine seedbed.
  - Soil testing and amendment (e.g., lime, fertilizer).
- **Planting:**
  - **Seeds:** Sowing in rows or broadcasting.
- **Cuttings:** Using stem or root cuttings for vegetative propagation.
- **Maintenance:**
  - Weed control, fertilization, and irrigation.





Land propagation

- Plow to open the soil and leave it to dry for about four weeks to kill weeds and decompose.
- Plow and harrow to break up the soil, creating a uniform layer.
- To ensure the ground is uniform and level.
- This makes it easier to manage the plot and prevents flooding within the plot.

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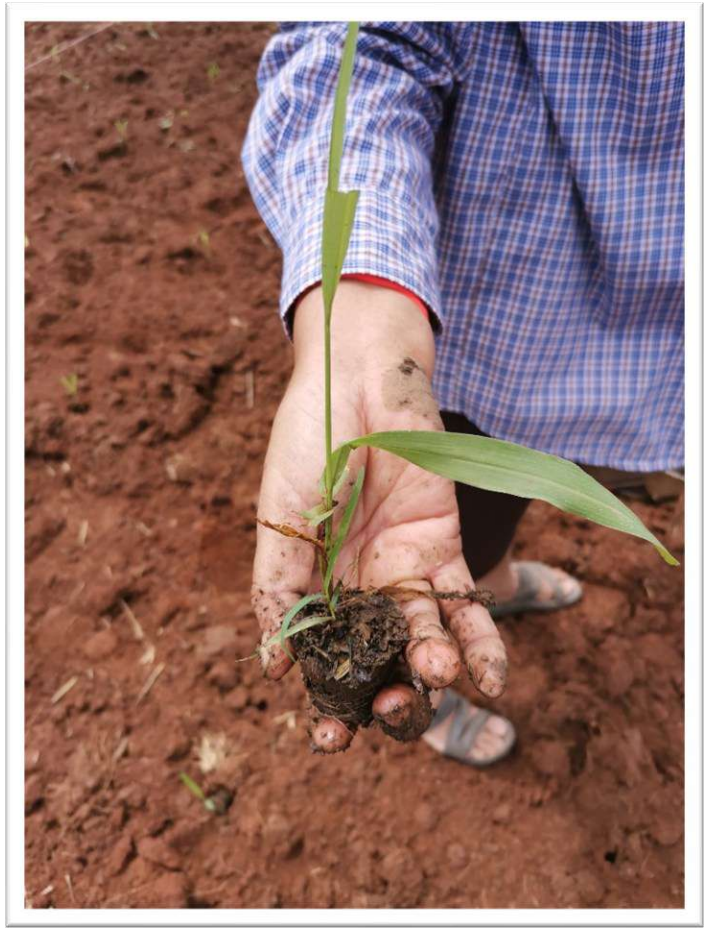
Planting







Fertilizing

- During the land preparation period before planting.

-Next time application should be after cutting and after weeding the plot.

* The soil's fertility should be considered when applying fertilizer.

Propagated :
Seed
Seedling
Stolon cutting
Stem cutting

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Weed Control

2-4 weeks after planting and again whenever weeds are found in the plot,
the plot should be kept clean at all times.

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Watering

Water immediately after planting and after every fertilizer application, especially during the dry season.

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Harvesting Yield

Fresh Cutting

Hay

Silage

Machinery

Manual Labor

Harvesting management

Harvesting management

Bad management

Good management

Good management

Results

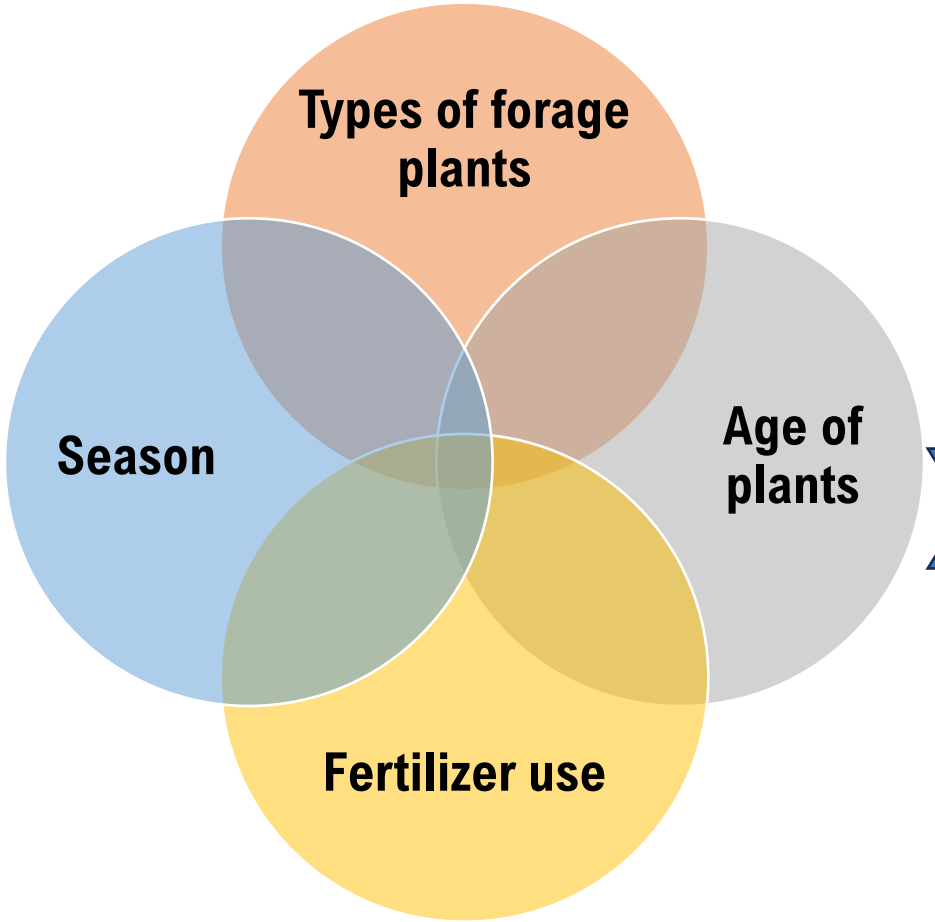
Results

Results

Forage fields that should be renovated:

- Yields are lower than normal (less than 50%).
- Uneven growth, excessive weeds
- Compacted topsoil, poor water permeability, and extensive dead plants.
- The forage field is 3-5 years old or older.

4 Factors in controlling the nutritional value of animal feed plants



Types of Forage Crops: Different plant species have different proportions of stem and leaf. Plants with a higher proportion of leaves have higher nutritional value.

Plant age and cutting period affect nutritional value. Older plants have higher fiber and lignin content, which reduces digestibility.

Fertilizer Use: Adequate fertilizer intake improves plant quality. For example, nitrogen fertilizers help with leaf production, resulting in increased leaf content.

Seasonal conditions affect the quality of forage crops. For example, during the dry season, plants have reduced leaf content. During the winter, plants flower, reducing yield and quality.

THE END

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