



**CIAT**

International Center for Tropical Agriculture  
*Since 1967 Science to cultivate change*

# Tropical Forages Factsheets

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**Tropical  
Forages**



Bundesministerium für  
wirtschaftliche Zusammenarbeit  
und Entwicklung

## *Panicum maximum* cv. Mombasa

Common name: Mombasa Grass



**Originally from Tanzania, grows up to 2 m tall building space taking tussocks with large leaves measuring about 3 cm wide and 97 cm long. The leaves are erect, breaking at the tips and are pubescent. Stems do not have hair or wax. Similar to Hybrid Napier grass in habit, but more leafy. Suitable for grazing, silage and fresh in feeding trough. Not suitable for haying due to its difficult drying characteristics. The forage quality is excellent.**

### Characteristics

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| Palatability                        | good                                 |
| Digestibility                       | ?                                    |
| Crude protein potential             | 8–14 % (depending on soil fertility) |
| Tolerance to water logging          | low                                  |
| Tolerance to drought                | good (Tropical seeds), low (SOEST)   |
| Tolerance to shade                  | good                                 |
| Water requirement                   | min. 800 mm/year                     |
| Planting density                    | 4–5 kg/ha                            |
| Planting depth                      | 1(-2) cm                             |
| Germination                         | 10–28 days                           |
| Days to first cut                   | 75–100 days                          |
| Time in rotation                    | 40–45 days                           |
| Plant height                        | 200 cm                               |
| Production potential                | 20–40 t Dry matter/ha/year           |
| Sol fertility requirements          | high                                 |
| Adaptability to soils with acid ph. | ?                                    |

### Seedbed preparation

*Panicum* would require a well prepared seed bed, due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small.

Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 50 cm apart (4kg/ha), or broadcasted sown at 6–8 kg/ha. For broadcast sowing, seed can be spread mechanically or hand sown. Sow the seed on to the soil surface, brush the seed with soil by using tree branches or large brooms. Bury the seed no more than 1–2 cm under the soil. It is easy to plant from rooted tillers, but due to its labour intensity is only an option for smaller plots. Seeding / planting can be started after 30 mm of rainfall.

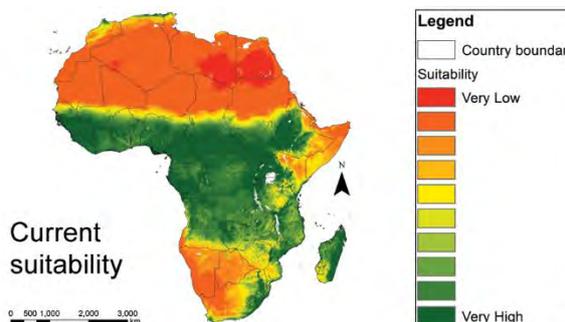
### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Preferably, application should be after harvesting and when the soils are wet enough to dissolve the fertilizer. Best harvest results will be realized by fertilizing 60 kg N / ha after each harvest.

### Management

*Panicum* will take 75–100 days till the first cut. In rotation the following cuts can be done after 40–45 days.

## *Brachiaria decumbens* cv. Basilisk



**Originally from Equatorial Africa, Basilisk it was part of the ‘Climate Smart Brachiaria Program’ (Kenya) and selected one of four best performing Brachiaria by a participatory evaluation. It stands 0.6 to 1 m high and is semi-erect. The rhizomes resemble small nodules and produce large numbers of stolons. The leaves are rigid, erect, and short, with few hairs; the sheaths are slightly hairy. Stays green well into the dry season. Suitable for grazing, silage, fresh in feeding trough and hay, but drying is moderate.**

### Characteristics

|                                     |   |
|-------------------------------------|---|
| Palatability                        | good  |
| Digestibility                       | good (50 – 60 %)  |
| Crude protein potential             | 7–10 %  |
| Tolerance to water logging          | moderate  |
| Tolerance to drought                | moderate  |
| Tolerance to shade                  | moderate  |
| Water requirement                   | 1000–3500 mm/year   |
| Planting density                    | 8 kg/ha, down to 2 kg for seeds with high germination rates |
| Planting depth                      | 1–2 cm  |
| Germination                         | 7–21 days   |
| Days to first cut                   | ~ 90 days   |
| Time in rotation                    | 25–45 days (wet season)<br>60–70 days (dry season)          |
| Plant height                        | 60–100 cm   |
| Production potential                | 8–12 t Dry matter/ha/year                                   |
| Sol fertility requirements          | high  |
| Adaptability to soils with acid ph. | high (3.9–7.5 pH)   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid

sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg /ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

### Management

*Brachiaria* will take 80–90 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## Brachiaria hybrid cv. Cayman



**A leafy, vigorous, semi-decumbent perennial grass of medium height, growing to between 80–110 cm without inflorescences. With a tillered growth habit, the Cayman grass produces abundant stolons. In addition in high moisture conditions, this grass modifies its growth habit and develops, early during its growth cycle, a large number of decumbent stems, which produce tillers and roots at the nodes. These superficial roots give the plant support, absorb nutrients and supply oxygen to the plant in these adverse conditions of poor drainage.**

### Characteristics

|                                     |   |
|-------------------------------------|---|
| Palatability                        | high  |
| Digestibility                       | high  |
| Crude protein potential             | up to 17% (depending on the soil quality)                   |
| Tolerance to water logging          | high  |
| Tolerance to drought                | good  |
| Tolerance to shade                  | poor  |
| Water requirement                   | min. 800 mm/year  |
| Planting density                    | 8–10 kg/ha, zero tillage                                    |
| Planting depth                      | 2 cm  |
| Germination                         | 7–21 days   |
| Days to first cut                   | 90–100 days   |
| Time in rotation                    | 25–30 days (wet season)<br>60–70 days (dry season)          |
| Plant height                        | 80–110 cm   |
| Production potential                | up to 15 t fresh material/ha every 10 weeks in rainy season |
| Sol fertility requirements          | medium to high  |
| Adaptability to soils with acid ph. | high  |
| Resistance to spittlebug attack     | high  |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid

sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg/ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

### Management

*Brachiaria* will take 70–80 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## Brachiaria hybrid cv. Cobra



Photo: Tropical Seeds, LLC.

**Cobra, unlike Mulato II and Cayman, has an erect growth habit with well-defined tussocks, which is ideal for cut and carry. This type of growth allows it to quickly recover from both cutting and grazing. Results from trials undertaken in Mexico and Costa Rica indicated that dry matter production increases when cutting is conducted at 30–45 days. Cobra's advantage over other cut and carry forages is that it not only produces a great amount of forage with high protein content, but also presents high digestibility (69%) and palatability as it stays tender, even when mature.**

### Characteristics

|                                     |  |
|-------------------------------------|--|
| Palatability                        | high   |
| Digestibility                       | high (69%)   |
| Crude protein potential             | up to 17% (depending on the soil quality)                    |
| Tolerance to water logging          | low  |
| Tolerance to drought                | good   |
| Tolerance to shade                  | poor   |
| Water requirement                   | min. 800 mm/year   |
| Planting density                    | 8–10 kg/ha, zero tillage                                     |
| Planting depth                      | 2 cm   |
| Germination                         | 7–21 days  |
| Days to first cut                   | 90 days  |
| Time in rotation                    | 30–45 days (wet season),<br>75 days (dry season)             |
| Plant height                        | ?  |
| Production potential                | on medium to fertile<br>soils > 20 t dry matter/hectare/year |
| Sol fertility requirements          | medium to high   |
| Adaptability to soils with acid ph. | high   |
| Resistance to spittlebug attack     | high   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilth

necessary for seeds that are small. Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg/ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

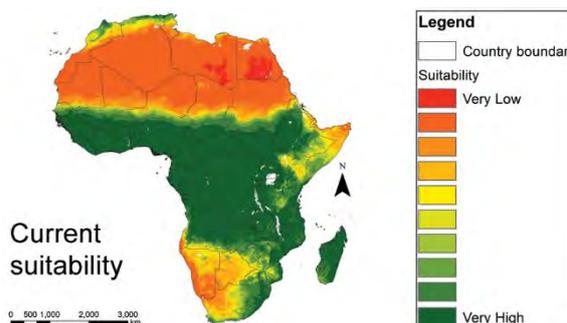
### Management

*Brachiaria* Cobra will take ~ 90 days till the first cut. In rotation the following cuts can be done after 30–45 days while rainy season respectively 75 while dry season.

## *Brachiaria brizantha* cv. MG4



Photo: Sementes Alvorada



Originally from Colombia. MG 4 stands 1.5 m high; has short, horizontal rhizomes which are yellow or purplish; intensely green stems that are vigorous, erect or semi-erect. The hairless leaves are linear-lanceolate and rounded at the base, usually 16 to 40 cm long and 10 to 20 mm wide. Leaf colour varies from light to deep green. Suitable for grazing, silage, fresh in feeding trough and hay, but drying is moderate. Quality of forage is good.

### Characteristics

|                                     |   |
|-------------------------------------|---|
| Palatability                        | good  |
| Digestibility                       | good (55–70%)   |
| Crude protein potential             | 7–14 %  |
| Tolerance to water logging          | poor  |
| Tolerance to drought                | high  |
| Tolerance to shade                  | good  |
| Water requirement                   | 800–3500 mm/year  |
| Planting density                    | 8 kg/ha, down to 4 kg for seeds with high germination rates |
| Planting depth                      | 1–2 cm  |
| Germination                         | 7–21 days   |
| Days to first cut                   | ~ 90 days   |
| Time in rotation                    | 25–45 days (wet season)<br>60–70 days (dry season)          |
| Plant height                        | 150 cm  |
| Production potential                | 10–18 t Dry matter/ha/year                                  |
| Sol fertility requirements          | medium  |
| Adaptability to soils with acid ph. | high (4.0–8.0 pH)   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid

sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg/ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

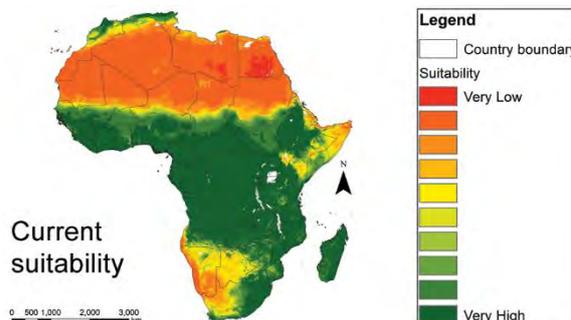
### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

### Management

*Brachiaria* will take 80–90 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## Brachiaria hybrid cv. Mulato II



**Mulato II is a leafy, vigorous, semi-decumbent perennial grass of medium height, growing to between 80–100 cm without inflorescences. It is a very leafy plant with 5–8 leaves (length 40–60 cm, width 0.6–0.7 cm) per stem. The intense green leaves are strongly pubescent on both sides of the leaves. Pubescens on the cylindrical stems is weak. It is recommended for regions with acid soils of medium to low fertility, prolonged periods of drought, high temperatures.**

### Characteristics

|  |  |
|--|--|
| <b>Palatability</b>                        | high   |
| <b>Digestibility</b>                       | high   |
| <b>Crude protein potential</b>             | up to 18% (depending on the soil quality)  |
| <b>Tolerance to water logging</b>          | poor   |
| <b>Tolerance to drought</b>                | good   |
| <b>Tolerance to shade</b>                  | poor   |
| <b>Water requirement</b>                   | min. 800 mm/year   |
| <b>Planting density</b>                    | 8–10 kg/ha, zero tillage   |
| <b>Planting depth</b>                      | 2 cm   |
| <b>Germination</b>                         | 7–21 days  |
| <b>Days to first cut</b>                   | 70–80 days   |
| <b>Time in rotation</b>                    | 25–45 days (wet season)<br>60–70 days (dry season)   |
| <b>Plant height</b>                        | 80–100 cm  |
| <b>Production potential</b>                | on low fertile land (ph. 4.7) 14–17 t dry matter/ha/year.<br>On high fertile soils (ph. 6.3) up to 35 t dry matter/ha/year |
| <b>Sol fertility requirements</b>          | medium to high   |
| <b>Adaptability to soils with acid ph.</b> | high   |
| <b>Resistance to spittlebug attack</b>     | high   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilth

necessary for seeds that are small. Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg /ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

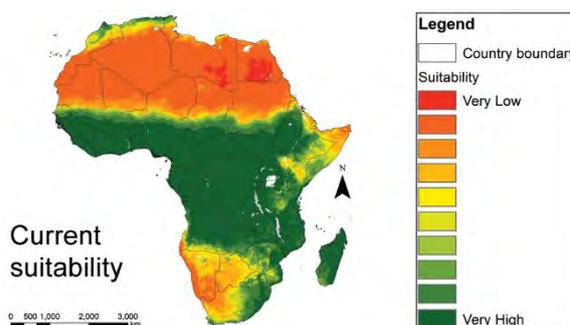
### Management

*Brachiaria* will take 70–80 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## *Brachiaria brizantha* cv. Piatá



Photo: Sementes Alvorada



*Piatá* is a leafy, vigorous, semi-decumbent perennial grass of medium height, growing to between 85–110 cm in height without inflorescences. It is a very leafy plant with about 57 % leaves in the produced biomass. The leaves are of a length of ~ 45 cm and a width of ~1.8 cm and show no hair. The stems are green and fine with a diameter of ~ 0.4 cm. Suitable for grazing, silage, fresh in feeding trough and hay, but drying is moderate.

### Characteristics

|                                     |   |
|-------------------------------------|---|
| Palatability                        | good  |
| Digestibility                       | good (55–70 %)  |
| Crude protein potential             | 7–14% (average 12%)   |
| Tolerance to water logging          | poor  |
| Tolerance to drought                | high  |
| Tolerance to shade                  | good  |
| Water requirement                   | 800–3500 mm/year  |
| Planting density                    | 8–9 kg/ha, down to 4 kg for seeds with high germination rates |
| Planting depth                      | 1–2 cm  |
| Germination                         | 7–21 days   |
| Days to first cut                   | ~ 90 days   |
| Time in rotation                    | 25–45 days (wet season)<br>60–70 days (dry season)            |
| Plant height                        | 85–110 cm   |
| Production potential                | 8–15 t Dry matter/ha/year                                     |
| Sol fertility requirements          | medium  |
| Adaptability to soils with acid ph. | medium (4.0 – 8.0 pH)   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts

necessary for seeds that are small. Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg /ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

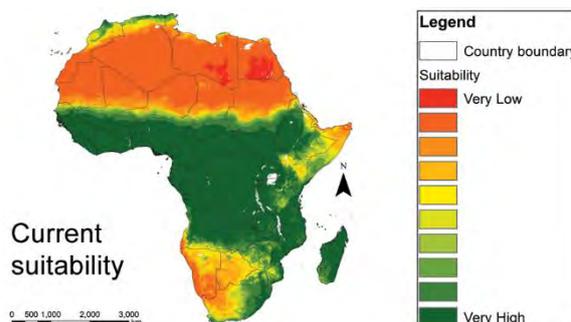
### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

### Management

*Brachiaria* will take 80–90 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## *Brachiaria brizantha* cv. Xaraes (Toledo)



*Xaraes* is forming well defined clumps reaching a height of 1.5 m. The deep green stems are strong, erect to semi erect with little branching. The hairless leaves are linear-lanceolate and vary in colour from light to deep green. The setting of inflorescences is very late. Suitable for grazing, silage, fresh in feeding trough and hay, but drying is moderate.

### Characteristics

|                                     |   |
|-------------------------------------|---|
| Palatability                        | good  |
| Digestibility                       | good (55–70 %)  |
| Crude protein potential             | 7–14%   |
| Tolerance to water logging          | poor–moderate   |
| Tolerance to drought                | medium  |
| Tolerance to shade                  | good  |
| Water requirement                   | 900–3500 mm/year  |
| Planting density                    | 8 kg/ha, down to 4 kg for seeds with high germination rates             |
| Planting depth                      | 2 cm  |
| Germination                         | 7–21 days   |
| Days to first cut                   | ~ 90 days   |
| Time in rotation                    | 25–45 days (wet season)<br>60–70 days (dry season)                      |
| Plant height                        | 150 cm  |
| Production potential                | 10–18 t Dry matter/ha/year (CIAT)<br>20–30 t Dry matter/ha/year (SOESP) |
| Sol fertility requirements          | medium  |
| Adaptability to soils with acid ph. | medium (4.0 – 8.0 pH)   |

### Seedbed preparation

*Brachiaria* would require a well prepared seed bed. Due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid

sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 40–50 cm apart (8 kg /ha), or broadcasted sown at 10–12 kg/ha. For drilling through seed drills, be very careful not to bury the seed more than 2 cm in depth. Roller drills are preferred because they do not bury the seed too deeply, but instead press the seed just below the soil surface. For broadcast sowings, seed can be spread mechanically or hand sown. The seed must be covered after sowing by harrows. On small areas, tree branches or large brooms can be used to lightly cover the seeds with soil. Be careful not to bury the seed no more than 1–2 cm under the soil. Seeding can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Application should be done after rains and the soils is wet enough to dissolve the fertilizer. Preferably, application should be after harvesting and the soils are wet, for the regrowth.

### Management

*Brachiaria* will take 80–90 days till the first cut. In rotation the following cuts can be done after 25–45 days while rainy season respectively 60–70 while dry season.

## *Panicum maximum* cv. Massai



**Massai grass is a spontaneous hybrid between *Panicum maximum* and *Panicum infestum*, commercially launched in 2001 by Embrapa (Brazil). The average reached height is 60 cm. Leaves are brittle and erect with an average width of 9 mm, the blades have a moderate amount of short stiffed hair on the upper side. The forage quality is good. Massai grass stands out for its rapid growth rate, low seasonality (Euclides et al. 2008), greater resistance to drought and froghoppers (Embrapa 2001), high tolerance to acidity (Valentim et al. 2001) and reduced phosphorus (P) content in the soil, since there is no need for fertilizer replenishment (Euclides et al. 2008). As such, Massai grass requires less fertilizer and is therefore more resilient in conditions of low fertility (Embrapa 2001). Suitable for grazing and haying (drying is easy). Not suitable for silage.**

### Characteristics

|                                     |                                   |
|-------------------------------------|-----------------------------------|
| Palatability                        | good                              |
| Digestibility                       | ?                                 |
| Crude protein potential             | ?                                 |
| Tolerance to water logging          | moderate                          |
| Tolerance to drought                | moderate                          |
| Tolerance to shade                  | ?                                 |
| Water requirement                   | min 800 mm/year                   |
| Planting density                    |                                   |
|                                     | 4–5 kg/ha in 50 cm spaced rows    |
|                                     | 6–8 kg/ha for broadcast sowing    |
| Planting depth                      | 1(-2) cm                          |
| Germination                         | 10–28 days                        |
| Days to first cut                   | 75–100 days                       |
| Time in rotation                    | 40–45 days                        |
| Plant height                        | 60 cm                             |
| Production potential                |                                   |
|                                     | 10–15 t Dry matter/ha/year (CIAT) |
| Sol fertility requirements          | low                               |
| Adaptability to soils with acid ph. | good                              |

### Seedbed preparation

*Panicum* would require a well prepared seed bed, due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically

control these weeds. Plough to about 25 cm depth and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 50 cm apart (4 kg/ha), or broadcasted sown at 6–8 kg/ha. For broadcast sowing, seed can be spread mechanically or hand sown. Sow the seed on to the soil surface, brush the seed with soil by using tree branches or large brooms. Bury the seed no more than 1(-2) cm under the soil. It is easy to plant from rooted tillers, but due to its labour intensity it is only an option for smaller plots. Seeding / planting can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Preferably, application should be after harvesting and when the soils are wet enough to dissolve the fertilizer.

### Management

*Panicum* will take 75–100 days till the first cut. In rotation the following cuts can be done after 40–45 days..

## *Panicum maximum* cv. Tanzania



Originally from tropical Africa. *Tanzania guinea* is a tall grass, 1,5-2,5 m high, which is very suitable for cut and carry. The leaves are decumbent and medium sized, 2.6 cm wide and 77 cm long; stems and leaves are without hair and wax. Similar to Hybrid Napier in habit, but more leafy. In South America it is grazed, but in Thailand is mainly used for cut and carry forage. It is the main grass for fresh grass sales in Thailand. It is a very productive leafy grass, producing between 12 and 30 t dry matter per year. Suitable for grazing, silage and fresh in feeding trough. Not suitable for haying due to its difficult drying characteristics. The forage quality is excellent.

### Characteristics

|                                     |  |
|-------------------------------------|--|
| Palatability                        | good   |
| Digestibility                       | ?  |
| Crude protein potential             | 8–16 % (depending on soil fertility)               |
| Tolerance to water logging          | low–moderate                                       |
| Tolerance to drought                | good (Tropical seeds), low (SOEST)                 |
| Tolerance to shade                  | good   |
| Water requirement                   | min 800 mm/year                                    |
| Planting density                    | 4–5 kg/ha in 50 cm spaced rows                     |
| Planting depth                      | 1(-2) cm   |
| Germination                         | 10–28 days   |
| Days to first cut                   | 75–100 days  |
| Time in rotation                    | 40–45 days (wet season)<br>60–70 days (day season) |
| Plant height                        | 150–250 cm   |
| Production potential                | 20–40 t Dry matter/ha/year                         |
| Sol fertility requirements          | high   |
| Adaptability to soils with acid ph. | ?  |

### Seedbed preparation

*Panicum* would require a well prepared seed bed, due to the small seeds. A fine seedbed would be preferable. As for most crops, seedbed preparation should be done well before the rains for ease of preparation and killing of weeds. If the piece of land is prone to obnoxious weeds, e.g. couch grass, herbicide spraying is advisable to systematically control these weeds. Plough to about 25 cm depth

and harrow the land to obtain a fine soil tilts necessary for seeds that are small. Preferably avoid sloping and uneven land for lay the plots and minimize likely variations in performance.

### Establishment

Can be either planted in rows, 50 cm apart (4 kg/ha), or broadcasted sown at 6–8 kg/ha. For broadcast sowing, seed can be spread mechanically or hand sown. Sow the seed on to the soil surface, brush the seed with soil by using tree branches or large brooms. Bury the seed no more than 1(-2) cm under the soil. It is easy to plant from rooted tillers, but due to its labour intensity it is only an option for smaller plots. Seeding / planting can be started after 30 mm of rainfall.

### Fertilisation

After fertilizer application during planting (for the initial fertilization use a phosphorus dominated fertilizer to support root development – DAP), subsequent applications should be annually with nitrogenous fertilizer at a rate of 100 kg/ha of calcium ammonium nitrate (CAN). Preferably, application should be after harvesting and when the soils are wet enough to dissolve the fertilizer. Best harvest results will be realized by fertilizing 60 kg N / ha after each harvest.

### Management

*Panicum* will take 75–100 days till the first cut. In rotation the following cuts can be done after 40–45 days.