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Zimbabwe AGRICULTURAL GROWTH Programme

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BEEF ENTERPRISE STRENGTHENING AND TRANSFORMATION PROJECT

Velvet Bean (*Mucunapruriensvar. utilis*) Technical Bulletin

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General Characteristics:

- Annual or sometimes biannual (possibly into a second season).
- The cultivated mucuna does not cause itching (or very little, from dry leaves and pods), whereas the wild type (buffalo bean, *Mucunacoriacea*) has hairs which cause extreme itching.
- Velvet bean is a vine with very vigorous twining stems that may be as long as 6 m, with large trifoliate leaves (3 leaflets).
- Flower clusters are about 10 cm across with deep purple flowers.
- Pods 4-13 cm long, 1-2 cm wide, with up to 7 seeds. The seeds of the local landrace are usually mottled dark and light brown. The 1000-seed mass is upwards of 500 g: the local landrace has very large seeds and a 1000-seed mass of about 1000 g, ie. 1000 seeds per kg.
- Relatively resistant to pests and diseases (unlike cowpea and lablab). R sistant to root knot nematodes/eelworm and the witchweed of legumes (*Alectravogelii*). Can suffer from *Cercospora* leaf spot, especially in second year growth, and *Phytophthora* wilt, particularly if waterlogged.
- Potential to produce high yields of biomass and seed.
- After harvesting seed, can leave over 70 kg N/ha in leaf/stem residues and roots/nodules for a following crop.
- Growth may be slow initially (but more rapid than lablab), therefore at least one weeding is required.
- Velvet bean has a long growing season and is late flowering, starting in early March and proceeding into April (later than cowpea and earlier than lablab).

Uses

For Livestock Feed:

- As cut-and-carry green feed: start to cut to 15 cm from 2-3 months after planting, then every 3 months until it dries up.
- As deferred grazing from about April as it stays green well into the dry season.
- The forage can be conserved as hay, or as silage (mixed with maize, sorghum, elephant grass), for dry season feeding.
- The seed/pods can be used as an ingredient of home mixed concentrate feed to replace bought stockfeed. Palatability of the seed/pods can be improved by grinding or by soaking the seed for 24-48 hours. The seeds contain L-Dopa which is toxic to monogastric animals. Only feed to

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pigs if first treated by repeated soaking and boiling. This also applies to using the seed for human food. DO NOT feed to chickens.

- After harvesting the pods it is recommended that the residue is baled for feeding in the dry season.

For soil fertility improvement:

- Adding organic matter (OM) to the soil will improve soil fertility (adding nutrients and decreasing leaching) and moisture conservation (increasing the water holding capacity).
- The addition of OM also decreases the prevalence of witchweed (striga) and root knot nematodes (eelworm).
- As velvet bean is resistant to root knot nematodes (eelworm), in a rotation it will help to control this pest.
- This may be as green manure or as a green manure cover crop (GMCC) or as crop residues left after harvesting hay or seed. Even if the velvet bean residues are collected or grazed, some OM will still be contributed by the roots and nodules.
- Velvet bean can also be undersown into a maize grain crop 3-4 weeks after sowing the maize.

For human consumption:

- Velvet bean seeds can be considered as a famine food, with steps taken to remove the toxic L-Dopa.
- Crack the dry seed into several pieces.
- Soak overnight; discard the water.
- Boil for 20 min; let cool to room temperature then throw away the water.
- Soak again overnight; throw away the water.
- Dry the soaked and boiled pieces in the sun.
- Pound into flour.
- Combine 1:3 with maize meal (eg. 1 cup velvet bean meal + 3 cups maize meal); make sadza.

Environmental Adaption

- Rainfall – said to need > 650 mm, but local experience has shown that it will grow well in Natural region (NR) 4 and can withstand drought and NR 5 conditions. Has a deep tap root which enables the plant to grow well into the dry season.
- Frost sensitive: frost will kill the plants.
- Soils: grows well on a wide range, from poor sands to clays; pH 4.5-6.5.

Productivity

- Velvet bean can produce high yields of biomass: over 10 t/ha dry matter (DM) in Natural Region (NR)2 and up to 6 tDM/ha in NR 4.

- The Nitrogen/crude protein (CP) content in hay is good at 10-14 % CP when cut at the early green pod stage.
- Seed yields are also high: up to 2 t/ha in NR2 and 1t/ha in NR4. Seed yield can be increased by about 50 % by having the velvet bean climb up a support of maize or sorghum planted at a spacing of 0.6 m x 0.9 m, or sunnhemp at 3 kg/ha. This will also increase biomass yields.
- The CP content of the seed is high at 20-25 % CP; in pods (shell and seed) 16 % CP, and shell 7-8% CP.
- Residue collected after harvesting the pods has a CP content of about 6 %.
- Maize-velvet bean silage will have a CP content of about 10-12% (up from about 7 % in pure maize silage).

Establishment

- As it has such a large seed, land preparation can be minimal.
- The application of lime (eg. 500 kg/ha on sandy soil) to decrease soil acidity (increase pH) will improve nodulation and availability/solubility of soil nutrients, especially phosphorus (P).
- Dry planting before the rains is recommended: more biomass is accumulated with a longer growing season. Place the seed into a planting hole at least 5 cm deep. Shallower planting can result in a light rainfall causing only partial wetting and swelling of the seed with subsequent germination failure.
- Will take 1-2 weeks to emerge after wetting.
- Rows 0.9 m apart, with seeds 30 – 40 cm apart in the row.
- Seeding rate: a spacing of 0.9 m x 30 – 40 cm targets a population of 37 000 or 28 000 /ha. With 1000 seeds/kg and allowance for 10 % losses this means 41 000 or 31 000 seeds/ha and therefore a seeding rate of 41 or 31 kg/ha.
- After emergence gap fill as necessary.
- If velvet bean is to be intercropped with maize or sorghum (to improve the CP content of either stover or silage) it should be planted 3-4 weeks later than the maize or sorghum emergence, otherwise it will compete too strongly and smother the cereal crop. Plant in the row with a spacing of 50 cm.
- In very infertile soils an application of 200 kg/ha single superphosphate (SSP) incorporated before planting, and 100 kg/ha ammonium nitrate (AN) applied a month after emergence, will increase biomass and seed yields.
- Only one weeding is usually required, but if seed is in short supply and wider spacing is used, then the plants will take longer to cover the ground and another weeding may be necessary.

Cutting for Hay

- This should be done at the early green pod stage for hay of good quality. As flowering begins in early March, this will be in about mid-April .

- The stems can take some drying. A sunny period with no rain of at least 3 days is required to dry the stems adequately.
- Cut the main stem off just above the ground and leave the plants to dry in the field.
- Turning is necessary to promote drying throughout. Turn twice a day initially, then once a day to avoid leaf shatter through excessive handling. Dry for 3-5 days.
- Bale the hay.
- Conditioning will promote drying of the stems. This is crushing the biomass by rolling over it on a hard surface with a 200 litre drum of water covered with wire mesh.

Harvesting Seed

- Seed is mature in about May-June.
- Pods are harvested after the leaves have fallen and when brown and split open when twisted.
- The pods can be put in the sun to dry and shatter, then the seed collected, or if needed sooner, pods can be broken by beating them in a sack with a long stout stick to release the seed.
- The crop residue can be grazed in the field, but it is recommended that it is baled for dry season feeding.

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