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ELEPHANT GRASS

(*Pennisetum purpureum*—Schum)

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and

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(Revised from Leaflet No. 600, by H. G. Elliott)

ELEPHANT Grass, sometimes known as Napier's Fodder, is a hardy, palatable and nutritious plant which under good conditions will give heavy yields. When once established it will remain as a permanent stand so long as it receives good treatment. It grows well in many parts of Western Australia and up to date appears to be free from attack by pests and diseases.

It was first introduced into Western Australia in 1916 by Mr. A. Crawford, then Chief Inspector of Rabbits, Department of Agriculture, who obtained a small sample of seed from Rhodesia, Central Africa. The seed was planted in his garden at Claremont and only one germinated. From the resulting plant supplies have been distributed over Western Australia.

Several cuttings were grown by the late Mr. W. Catton Grasby in 1917, and some idea of the rapidity with which the plant multiplies can be gained from the fact that he distributed 4,000 cuttings in the spring of 1918 to farmers in various districts of the State.

In the "Agricultural Gazette" of New South Wales for October, 1916, there are some notes on trials of this grass made in the Sydney Botanical Gardens and elsewhere in that State. Mr. E. Breakwell, B.A., Agrostologist, stated that under Sydney conditions, the trial showed that the grass is hardy and palatable, and made good growth in the winter months. Up to the time of writing, seed

had not developed, but no difficulty had been found in growing the grass from rooted slips or cuttings. In Rhodesia it has the reputation of being "drought resistant, capable of enduring winter conditions and adapted to light soils," and this has been confirmed in New South Wales, but the results were at the time of the report inconclusive.

HABITAT

The species is a native of tropical Africa, where it has a very wide range between 10 degrees N. Lat. and 20 degrees S. Lat. The northern limit runs from Sierra Leone through the great equatorial forest zone to the Cameroons, thence to the Nile, Lake Victoria and British East Africa. The southern limits run through Angola to Katanga, thence across the middle Zambezi to Eastern Rhodesia as far east as Beira. Within this immense area it occurs principally along watercourses and in marshy depressions, but occurs also in the well-lighted forest areas. It often forms reed jungles. In the drier savannahs of East Africa it is rarely more than six feet high.

In Western Australia, under drier conditions than in its native habitat, six to eight feet is considered a good growth.

The grass has been under notice in Africa since 1905, and is considered one of the best fodder grasses there, where it has been tested under severe conditions for some years.



Fig. 1.—Elephant grass planted three years ago at the Animal Health and Nutrition Laboratories. This grass has been cut frequently and the tall plants in the photograph shows 35 days' growth since cutting. The short plants are of 10 days' growth.

HABIT

Elephant grass (*Pennisetum purpureum*) is a coarse grass when mature, and is characterised by extremely rapid growth under moist and warm conditions. It grows in clumps which stool prolifically, and is thus usually planted in rows from four to six feet between the plants.

Mature leaves, which attain a length of 2-2½ feet are coarse, but, when the plant is grazed or cut, the young shoots, until the plant reaches a height of three feet, are soft, succulent and relished by stock.

There appear to have been several distinct strains evolved, differing in such characters as hairiness of leaf and stem, height at maturity, etc.

SOIL REQUIREMENTS

Good stands may be seen on coastal soils at Karridale, on the heavy "black" clays of the Kimberley and on "sand-plain" in parts of the wheat belt.

Being a deep rooted perennial, elephant grass will not thrive in water-logged soils nor where there is a "hard pan" preventing root penetration.

Because of its hardiness there is a tendency to plant elephant grass in the least productive areas of the farm, hoping it will grow where other crops fail. This is quite the wrong attitude.

FERTILISER REQUIREMENTS

Knowing that elephant grass will give heavy yields of nutritious fodder for nine months year after year, it should be planted on the best ground available and generously fertilised.

Only by such treatment can full advantage be taken of the plant's ability to grow rapidly. The stand should receive two cwt. of superphosphate per acre yearly and as much organic manure as can be supplied. When grown under irrigated conditions, heavy yields of high quality material can be obtained.

CULTIVATION AND METHODS OF PLANTING

As seed is not available, propagation is carried out from roots or cuttings made from mature cane. The rooted plants are preferable as these become established with the minimum of effort.

For planting large areas, however, it may be easier to use cuttings containing three joints, as these can be prepared with less labour and strike well if planted under favourable conditions. If planted four feet apart, with five feet between the rows a little over 2,000 cuttings are needed per acre. Fortunately one planting will provide a crop for many years.

Elephant grass would be more extensively grown if it could be established from seed. Unfortunately the flowers which are produced in Southern Australia are mostly sterile. It is possible, however, that seed may be grown commercially in tropical areas and tests will be made with plants now growing at the Kimberley Research Station on the Ord River.

Where elephant grass is required to grow without irrigation it may be preferable to plant out roots with the first autumn rains. The plants will make some growth before the cold weather sets in and even if bitten by frost will be ready to get an early start with the first warmth of spring. A succession of severe frosts may kill elephant grass plants in the first winter after planting, but well-established tussocks can survive long periods of cold weather.

Elephant grass is very drought-resistant and, once established, will yield a surprising bulk of greenstuff without summer watering. It is advisable to cut young plants regularly as soon as they are growing vigorously. If uncut there is a tendency for one or two spindly canes to develop flower heads, whereas cutting will encourage stooling. For example, rooted plants which were put

out in September at the Animal Health Laboratory, Nedlands, had stoolled out to cover areas of up to two feet in diameter in nine months.



Fig. 2.—A photograph indicating the method of cutting at three to four weeks before the material has become fibrous. Half the tussock in the foreground had been cut when this photograph was taken.

VALUE AS A FODDER PLANT

Where ample moisture is present, elephant grass has a remarkable rapidity of growth and stooling characteristics and can be cut four to nine times in one season and will produce up to 50 tons of green fodder per acre. It is highly palatable, but becomes coarse if allowed to grow too high. It should be cut when about three feet high. Analyses show the value of this grass and figures for Sudan grass and maize are given for comparison:—

	Water.	Crude Protein.	Fat.	Carbo- hydrates.	Indig. Fibre.	Ash.
Elephant Grass (N.S.W.)	63.82	3.25	0.41	15.71	14.01	2.80
Sudan Grass	63.9	2.0	1.1	21.5	8.4	3.1
Maize, Green	76.9	1.9	0.6	13.9	5.5	1.2

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YIELD

Elephant grass, when correctly managed, gives very heavy yields of green material. For example, in September, 1949, roots were planted four feet apart each way in deep sand at the Animal Health Laboratory, Nedlands. From January onwards these plants were cut to ground level every three to four weeks. No estimate was made of the yield during the summer months when growth was at its best, but on 1st June the green material was weighed from a row of plants previously cut on 1st May. The average yield per plant was 10lb., which is equivalent to 12 tons of green fodder per acre, this being obtained despite unusually cold days during the growing period of one month.

This green material contained 24 per cent. dry matter. In other words, the crop yielded the equivalent to three tons of hay per acre. This was the seventh cutting from "slips" planted the previous September. Admittedly the crop was given ample water through sprinklers and was well fertilised, but the fact remains that it was grown on poor coastal sand which previously grew very little herbage even in the winter months.

COMPOSITION

Elephant grass stands if correctly managed will yield a high protein fodder. For example, the May cutting from



Fig. 3.—Contrast between young and old growth from elephant grass established in adjacent rows. Left—two months' growth containing 11 per cent. protein and 30 per cent. fibre. Right—Two weeks' growth containing 19 per cent. protein and 22 per cent. fibre.

the laboratory plot at Nedlands was very nutritious containing 24 per cent. protein in the dry matter and a stand of young elephant grass should be con-

ELEPHANT GRASS—COMPOSITION AT VARIOUS STAGES OF GROWTH.

Grown at Animal Health Laboratory, Nedlands. Deep coastal sand.

Date Sample Cut.	Description.	Composition as a Percentage of Dry Matter.			
		Crude Protein.	Crude Fibre.	Calcium as Ca.	Phosphorus as P.
22-12-49	Two weeks' growth after cutting to ground level. Robust plants in second year	19	22	0.94	0.42
22-12-49	Two months' growth after cutting to ground level. Robust plants in second year	11	30	0.53	0.35
....	First cutting of summer growth. Robust plants in second year	7	31	0.40	0.30
1-6-50	One month's growth after cutting to ground level. "Slips" planted out in September, 1949	24	22	0.45	0.65
<i>For Comparison.</i>					
29-8-47	Green lucerne, one month's growth. Animal Health Laboratory, Nedlands	24	20	1.73	0.47
Nov., 1947	Good quality meadow hay (subterranean clover and grasses), Margaret River area	13	28	0.90	0.19
....	Good wheaten and oaten hay, Western Australia	6	28	0.15	0.17
....	Wheat bran, Western Australia	15	10	0.08	0.65

sidered more as a protein-rich concentrate rather than as a roughage.

All pasture plants vary greatly in composition according to stage of growth and management. This is particularly the case with rapidly growing plants which become coarse and fibrous as they mature. Many growers, particularly poultry farmers, who have grown elephant grass, have made the mistake of letting the plants become too large before cutting. The effect of age on quality is shown very clearly in Table I, although the most mature sample there recorded was still soft and palatable by most standards. It is obvious that if greenstuff rich in protein and phosphorus is required, frequent cutting of elephant grass is essential.

With most plants frequent cutting reduces yield, often to a serious degree. Where bulk is of more importance than quality, as would be the case if feeding store cattle, it would pay to let the elephant grass grow for some months before cutting. Milking cows and laying hens, however, need food rich in protein and young elephant grass would be more valuable than a greater bulk of mature herbage. Just how often the stands should be cut to strike the best balance

between yield and quality has yet to be determined. From experience at the laboratory, however, it seems that heavy yields can be obtained throughout the summer from well-tended elephant grass despite cutting every three to four weeks.

In cutting elephant grass it is advisable to use a scythe or mower so as to remove the growth down to ground level. If canes are cut some distance above the ground, dead woody butts tend to accumulate, which interfere with cultural operations and reduce the plant efficiency. Cutting at ground level also tends to encourage underground suckering and the spread of the plant. With regular cutting, the stems are soft and make easy work for a scythe or mower.

GRAZING

It is generally assumed that elephant grass is a crop requiring considerable labour to harvest the green material. Once the plants are firmly rooted, however, strictly controlled grazing could be carried out. The grazing animal would be admitted to eat down the greenstuff as quickly as possible, then removed for three weeks or more for the plants to recover. Elephant grass is so palatable



Fig. 4.—Even on poor sandy soil elephant grass makes rapid growth. This plant had been cut to ground level five weeks previously.

while young that stock would soon kill the plants if allowed to graze continually.

Under certain conditions it may be an advantage to use a leguminous crop along with the elephant grass. Vetches or peas, for example, could be planted between the rows in the winter and perhaps cow peas could be used in the summer.

CONCLUSION

Elephant grass is a hardy perennial, well suited to the Western Australian climate. If managed correctly it yields a heavy annual crop of palatable nutritious herbage. Because of its high productivity elephant grass requires a good well drained soil with ample nitrogen-rich fertiliser. Regular cutting or well controlled grazing is essential if protein-rich herbage is desired.

Acknowledgment.—The analyses of the fodder samples grown at the Animal Health Laboratory were carried out by the Government Chemical Laboratories, and the authors wish to express their appreciation of the co-operation given in this work.

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