Groot Drackenstein, Cape Province.

October 8, 1919. Johannesburg to Pretoria.

The mines extend out for some distance. Beyond this there is a typical grass country. The termite hills are red. There are numerous plantations of eucalyptus and an occasional flood-water dam. The grass appears rather bunchy. Much of it is burned off. There are irrigated fields of oats in flower and many trees of weeping willow. On the crest where the soil is shallow the termite hills show gray. At this time, at the end of a long drought period, a large number of plants are just starting to grow. Elephantorrhiza is very abundant, and there are occasionally lilies. The soil is mostly dark red, the vegetation has the appearance of bunch grass. There are a few old corn fields. There are large herds of sheep and a few cattle. The tree plantations are all eucalyptus, but about the stations there are many other trees. At the edge of the break which occurs just before we arrive at Pretoria, where the railway passes down the grade, many proteas occur in the grassland on the rocky hills. The trees become larger and thicker as you pass down. Pretoria lies just below the break.

Pretoria. Went first to the botanical department, where I saw much of the department under the direction of Dr. Ethel M. Doidge. Here I saw photographs of what is known as the mottled leaf of the orange, and it is entirely distinct from any American form. They are much troubled with citrus canker.

I then went to see Dr. E. Phillips, who gave me a collection of sorghums from Basuto Land. He has also offered to supply corn from the same source, and also allowed me to photograph the sorghum sheets in the herbarium.

I then met Dr. Pole-Evans, with whom I spent the rest of this day,

and made arrangements to spend three days during the following week, beginning Sunday. He is a most interesting man, wide awake, and a good botanist; remembered Coleman Smith,and Wait, especially.

I went to see the secretary of agriculture, Mr. Smith, who was very much interested in our work and remembered especially Dr. Briggs and Smith. Also saw Paul Bibbink, the librarian, who is not at all pleased with the Smithsonian system of exchange, and is very much interested in bettering this system. I also saw Dr. C. E. Gray of the veterinary department, who gives the following recommendations to any traveler entering Central Africa:

> Secure metal boxes which will pack to 40 pounds,
> a khaki helmet for protection against the tropical sun,
> a flat iron for protection against the maggot fly,
> take 6 grains of quinine per day,-3 at night, 3 in the morning,
> and carry emetine for dysentery.
> Burrows and _____lead and opium tabloids,
> secure a tent with a mosquito bar (These should be purchased
> at Johannesburg and not at Bulowayo).
> The following should be secured

The following should be secured: Jacobinia rosea, also a Senecio from the green house. The Gutierrezia-like plant is Gigeria. Florida grass = Cynadon incompletus, which is a marvelously fine lawn grass. The street trees in Pretoria are exceedingly beautiful. Portulacaria africa was secured here. It grows well in the garden. With this plant in hand I was stopped in the depot and after several interviews and explanations was finally passed by the stationmaster with the remark that if Dr. Pole-Evans gave it to me he would allow it to pass. The package of sorghum seed went unchallenged. There is a general order that no live plants can be taken from one point to another without a permit from the botanical department.

Pretoria is an unusually beautiful city and the government buildings are set off by excellent planting of street trees and other vegetation.

(Note.--The karroo is primarily an area of succulents,--Crassula,

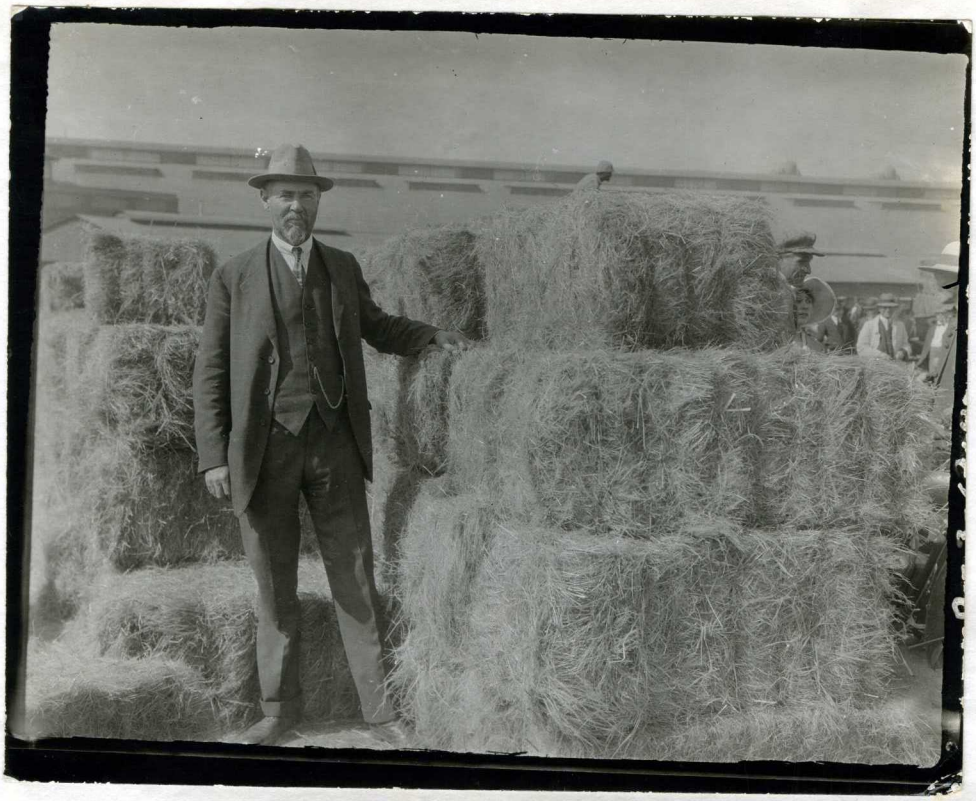
Mesembryanthemum, Cotyledon, etc., etc. The karroid plateau is a desert-shrub area with Zygophyllum and Lycium, karroo bush, etc., but very few succulents.)

A change of vegetation comes at the Orange river, also another change at Modder river.

The Kalahari is a great grassland.

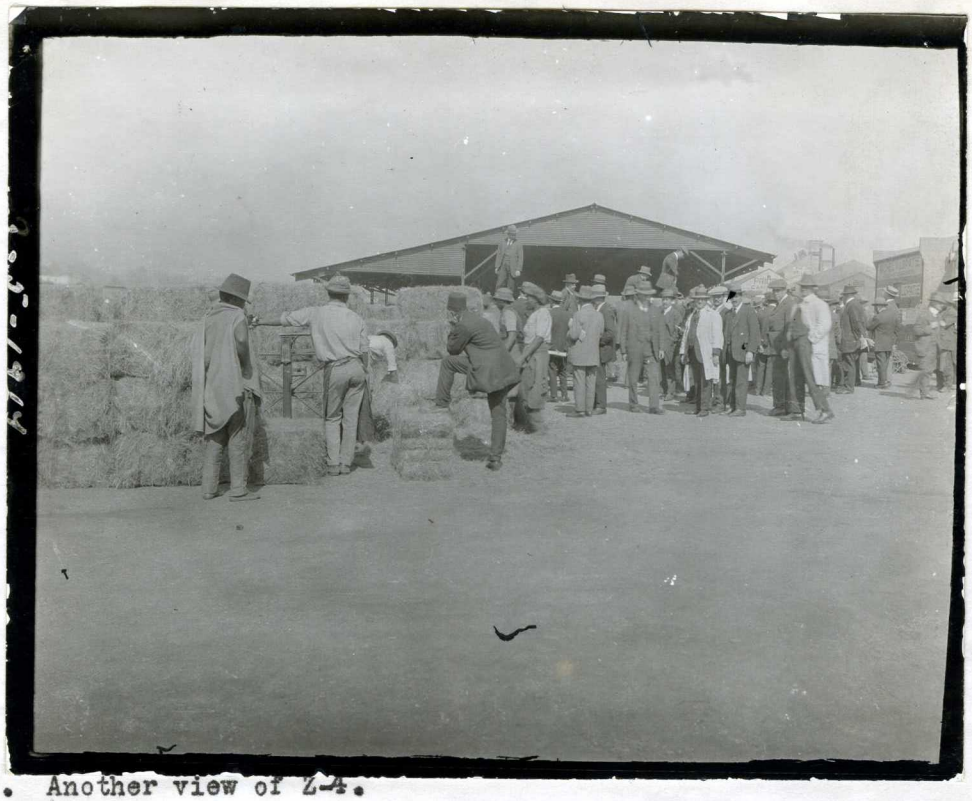
There is a big sweep of acacia just north of the Transvaal plateau which swings west and south to Kuruman. Addo bush region does not belong to the karroo but rather to the bush veld which extends north to Natal.

October 9, 1919. Went to the market with Burttdavy, a most interesting and helpful man, anxious to assist in every way. The hay market consists of the following: Teff, Eragrostis abyssinica, the most important forage plant. Sells at 15 pounds 10 shillings to L16-s10 per ton at this time. It is regarded as superior feed for horses but not quite as good for milk cows as is alfalfa. It grows in regions of annual summer rain, temperature seldom as high as 95° F. It should do well on the great plains, Montana to Texas, and possibly the high plateaus of New Mexico and Arizona, and in the highlands east of Tucson between Arizona and New Mexico. It has been planted annually, but in the Transvaal usually cuts three crops. It does not do as well when taken to the low veld. In Abyssinia this grass is grown as a grain crop, but in the Transvaal is used exclusively as a hay crop. A quarter of a million acres are grown annually in the Transvaal. The land is usually well prepared and planted at the rate of about 7 pounds per acre. Three crops are secured each year and can be sold with profit as low as five pounds per ton. It is a suitable grass for grazing, since it is very easily pulled up. A crop can be grown from seed in from six weeks to two months. This grass constitutes the principal hay market.



j-3. Shows Dr. J. Burtt-Davy, who introduced teff into the Transvaal. He first tried it in California, then took it to Transvaal with him when he went to South Africa.

Z-4. Selling teff hay in the market at Johannesburg at 15 pounds to 16 pounds and 10 shillings per ton. The auction method is universally used in South African markets.



Z-5. Another view of Z-4.

Z-6. A general view of the hay market showing teff, a small kind of oats cut and baled as hay. There are also bales of Themeda, field dried, and selling at 2 shillings 6 pence for 30 pounds.

Themeda is usually not cut for hay, but the drought period has been so long and the shortage of forage so great that all kinds of native hay are

now seen in the market. There are also bales of weeds, probably Bidens pilosa ,--very good feed, almost equal to alfalfa, but very disagreeable to have about when ripe.

Flay grass, Arundinella ecklonni, is also a weed used chiefly for bedding, and for this purpose is especially good, as it can be used over and over again.

Alfalfa and oats hay grown with irrigation. The alfalfa sells for 16 pounds per ton.

The chief crops of the Transvaal are,hay, consisting of teff, alfalfa and oats;/potatoes, chiefly Early King,--which is probably the best, Up-to-Date, Flower Bell and German Blue (These are on sale at 33 shillings 9 pence for 150 pounds).

Oats are grown chiefly with irrigation during the winter period. The Igeria variety is most common.

One of the most noxious weeds is the Mexican marigold, Tegetes mimuta. Schkuhria bonariensis is also a bad weed.

The market here, like all other markets in South Africa, is most interesting because produce is all sold by auctioneers, potatoes, cabbage and oranges in sacks. Very few crates are used and these are usually very heavy. Here I met Charles Beal, of Nelspruit, Transvaal, a dairy farmer. Also J. Whytock, manager, Agricultural Supply Company Association, Box 1148, Johannesburg.

October 10. Looked over the market again and took a few photographs.

Z-7. Shows oranges marketed in small gunny sacks exactly as potatoes are in this country. A few are shown in baskets at the left.

The oranges seemed to me to be not of the best quality, and the marketing methods very crude. When crates are used they are very heavy, made of 3/4 inch material as a rule.

Z-8. Shows green barley put up in small sheaves about 3/4 inches in diameter. Alfalfa is sometimes sold in the same way. Green feed is sold in all the South American markets.

Z-9. A general view of the hay market.

Z-10. Papaya on the market. Exceptionally large fruits, 12 inches long and 7 inches in diameter, bringing about 2 to 3 shillings each.

Much of the produce in this market comes from Natal or some other

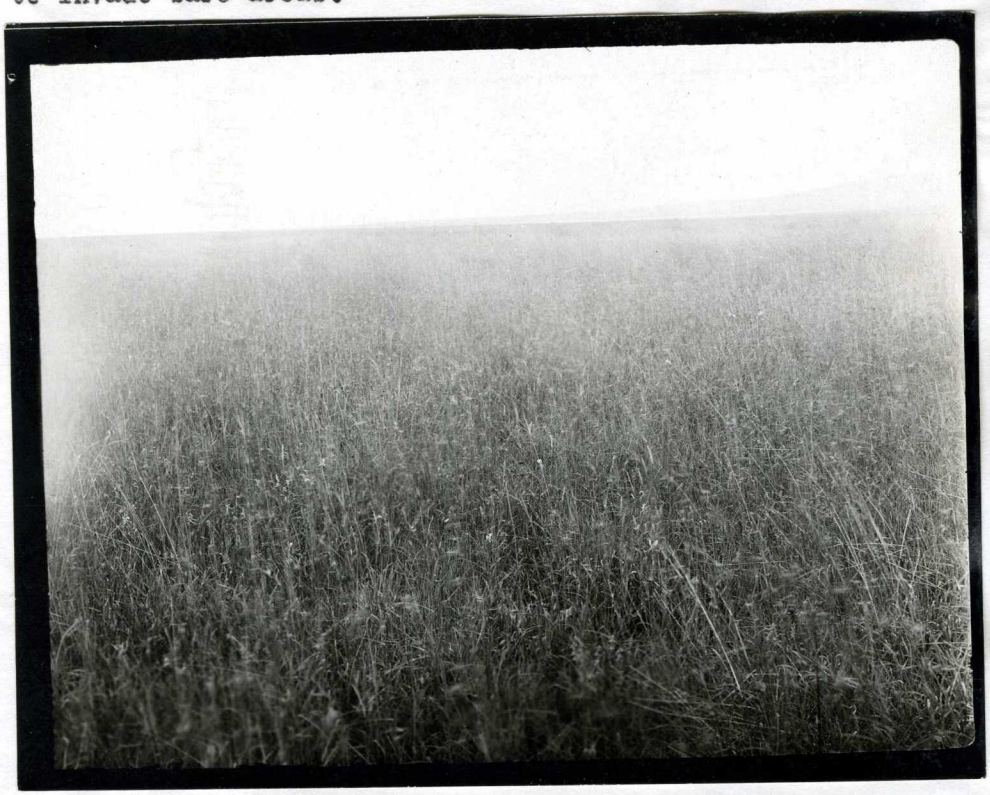
point in the low veld. Z-10 shows oranges also. The principal crops in the markets here are oranges and narches, cabbage, carrots and a few turnips. There are also beans and peas. Horse beans are sold green. There is a fair variety of vegetables, such as rhubarb, lettuce, radish and tomatoes.

October 11. Pretoria. Arrived at Pretoria at 9:30 a.m.

Z-11. A general view of the botanical department at Pretoria. It consists of a series of small workshops or laboratories with parked botanical garden-like grounds, the parking chiefly of mesembryanthemum, agave, aloe, etc.

I then went out with Dr. E. P. Phillips to look over some experiments he had been carrying on on the effect of burning off the grass cover. The results of this experiment have since been published. He was burning at different months, the early burnings showed a very profuse growth of the deep-rooted and large-rooted nun-grass or weed plants, such as Elephantorrhiza burchellia, Indiogofera hilaris, Hypoxis obtusa, Clerodendron triphyllum, which spring into growth far ahead of the spring or summer rains. If the

burning is done late just before the rains, the grasses start at the same time and the weediness is almost unnoticed. (Note--It seems to me that one possible explanation is that the dry grass standing for months really dries out the soil to so low a point that it holds back the weeds, or the later burning may scorch the tips and destroy them, forcing a new start. Slick spots are common but small and are likely to occur where the clay of the ant hill has been washed down. Cynodon is the first grass to invade bare areas.



Z-12. A general view of the grassland dominated by Themeda trianda, a tall, bunch-like cover about 2-1/3 to 3 feet high, very similar to our bunch grass on the western edge of the prairie. Andropogon amplectans is here also a prominent grass.

A1-1. A similar view showing the hill in the background covered with grass and Protea abyssinica.

A1-2. A view of grassland after burning. Shows a growth of the deep-rooted or storage-rooted plants, Elephantorrhiza burchellia, Indiogofera hilaris, Hypoxis obtusa, and Clerodendron triphyllum.

A-3. A general view of the grassland with a few plants of Protea abyssinica . This photograph was taken on the hills opposite the government buildings.

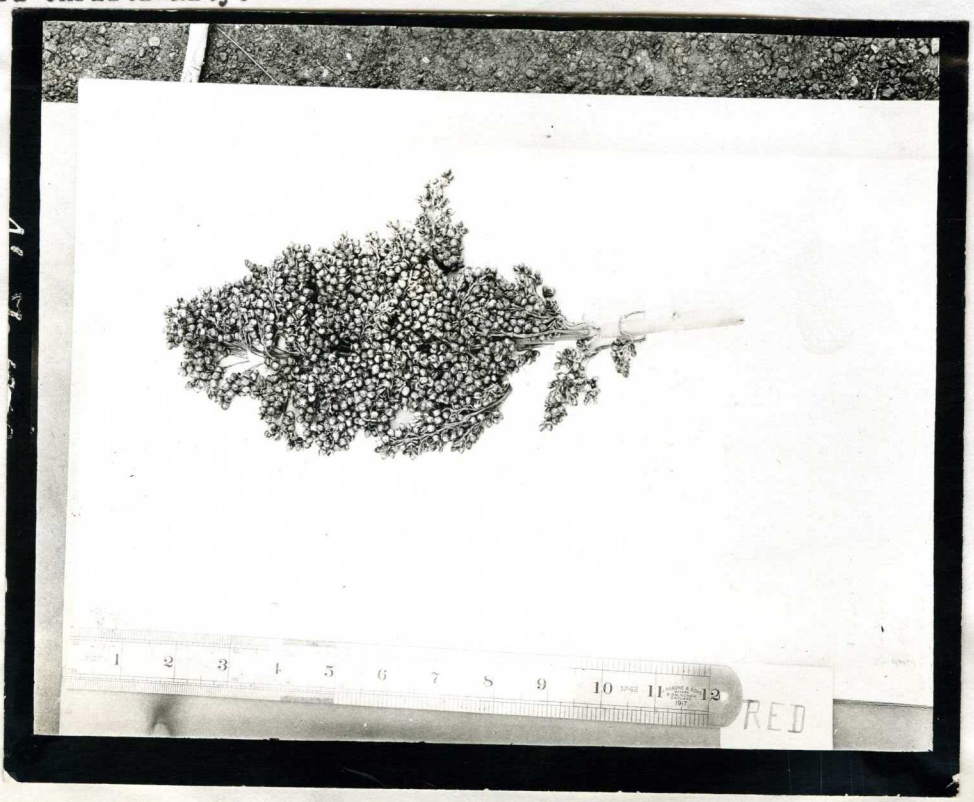
A-4. Similar view.

In the afternoon I photographed a series of kafir corns collected

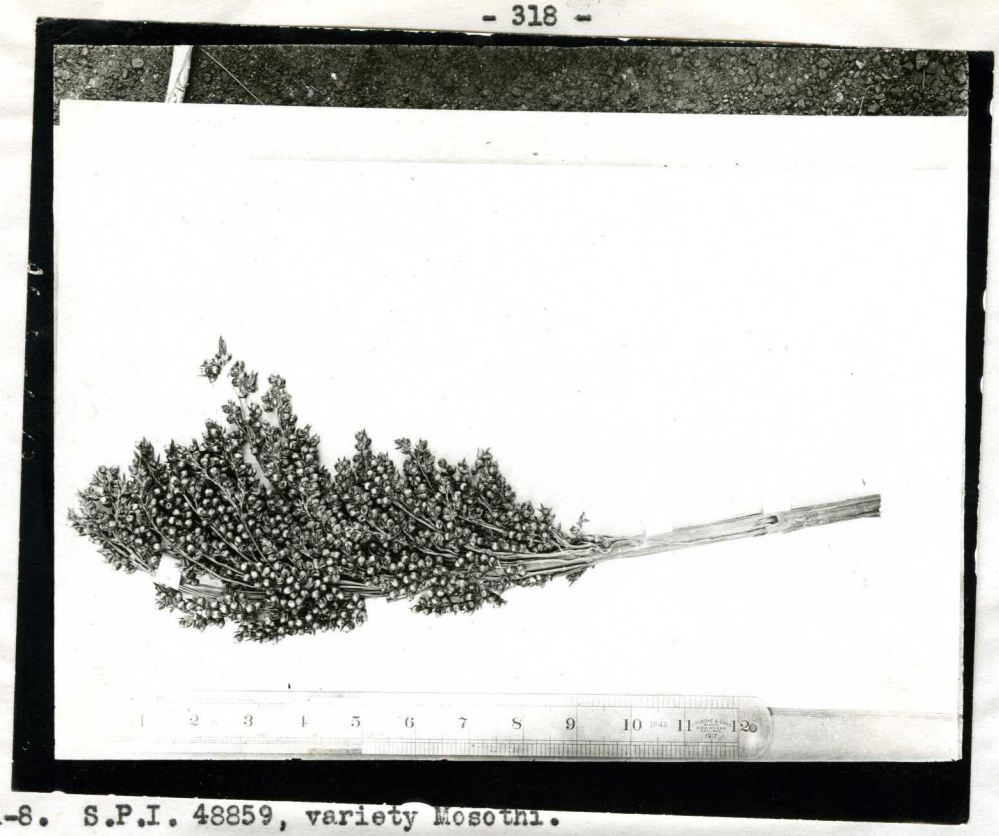
in Sutoland by Mme. Deiterlen, wife of Rev. H. Dieterlen, a French protestant missionary. These heads were collected in 1910. A spikelet of each with the label and the Sesuto name was sent in to the Department. Photographs show the label and the numbers. In two instances there are two distinct types under the same number. I have put into the photograph the word "red", or "white",to distinguish them and to enable the photograph and sample to be properly associated.

A1-5. Sorghum vulgare, S.P.I. 48850, known under the Sesuto name as Letsoeyene.

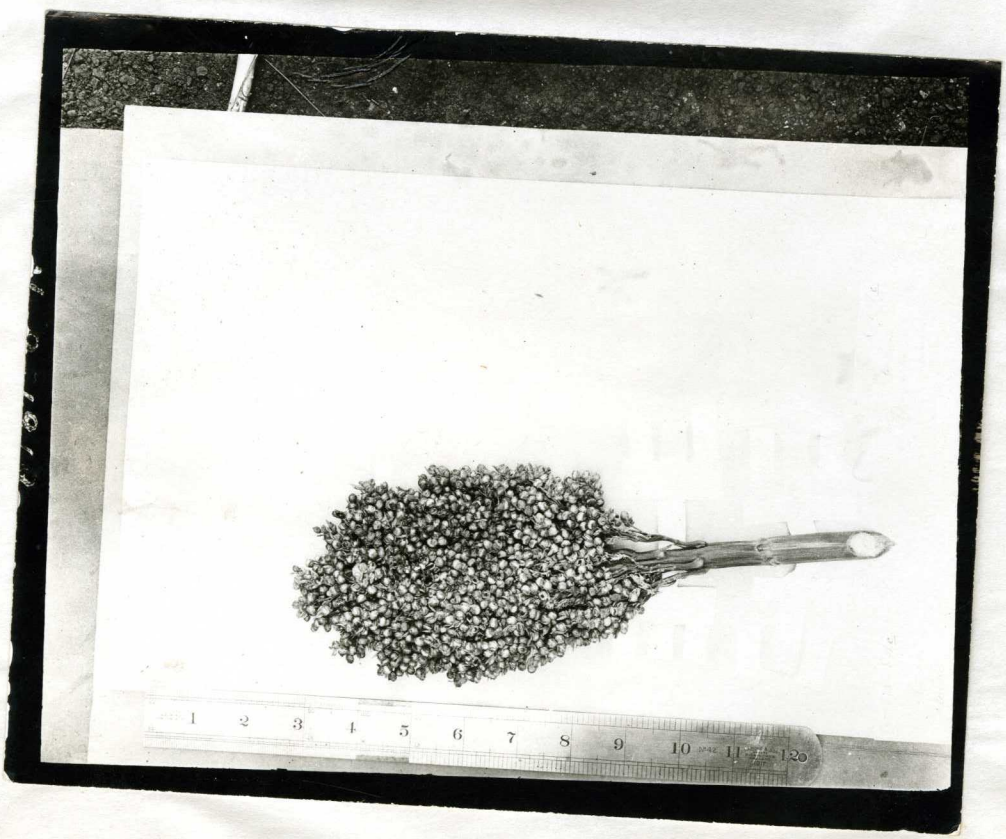
Al-6. S.P.I. 48849, Sesuto name Lejahane, because it is regarded by the Basutos as a degenerate type. Hojoka means to leave one's country to go to another, or to leave one's faith to adopt that of another. It is a name of derision given by Basutos given to those of their own people who have adopted Christianity.



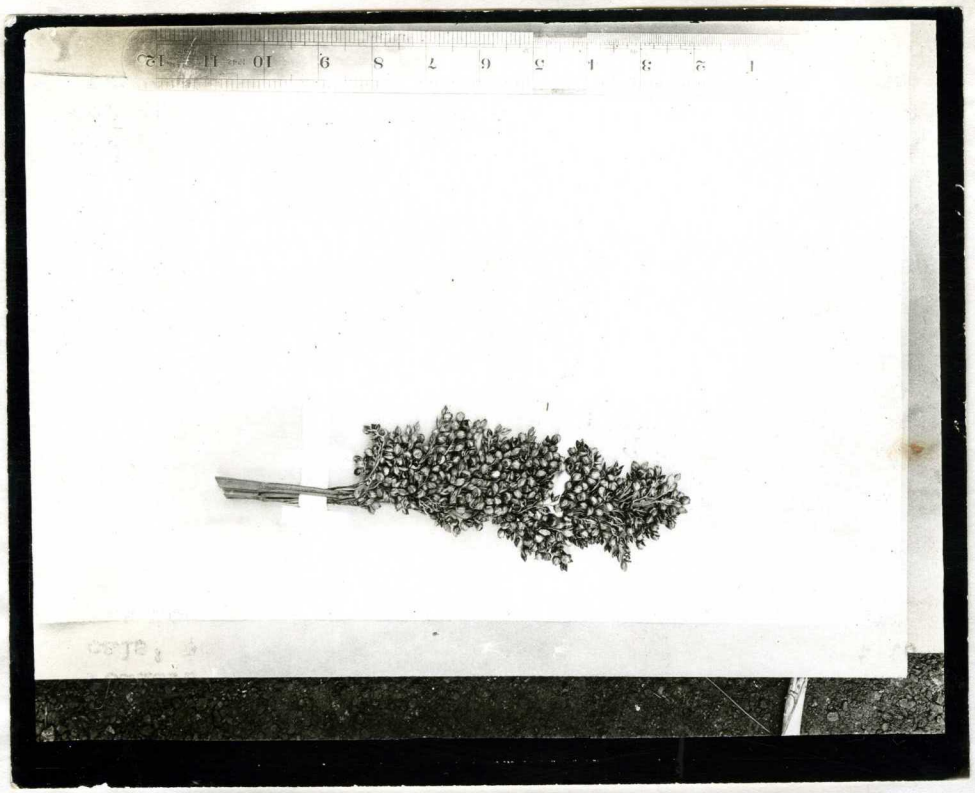
Al-7. S.P.I. 48856, Lajakane, similar to Al-6, but red. This is also said to be a degenerate, and is no longer called mabele, which is the generic name for Kafir corn.



A1-8. S.P.I. 48859, variety Mosothi.



A1-9. S.P.I. 48854, variety Seghobane.



A1-10. S.P.I. 48855. Called Pakollane.

A1-11. S.P.I. 48858, from near Phuthiatsane river, known among the Basutos as mothus.

A1-12. S.P.I. 48852, white type called ?

B1-1. S.P.I. 48853, a sweet sorghum, height about 4-5 feet, native name NTsoe. The tall stem is chewed. A preparation of this mixed with Erigeron canadensis is used for eczema. This concoction is first applied to the eruption and it is then rubbed in fat. The operation must be performed by the first cousin of the sick man; otherwise the natives believe it will have no effect.