

DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

PARAVIVO

A long lived winter growing lucerne

E.J. Crawford

Senior Plant Introduction Officer

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PARAVIVO - A LONG LIVED WINTER GROWING LUCERNE

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The value of lucerne (Medicago sativa) as a grazing, hay or seed crop has never been greater in South Australia than it is today.

Figures available indicate that there has been a doubling in area of lucerne in South Australia during the last 10 years.

Hunter River has been and still is the most important cultivar in use today. However, it has long been recognised that the lack of winter production particularly in areas of low temperature and light frosts, has been its main disadvantage.

Research work in the late 1950's and early 1960's resulted in the development of new cultivars such as African and Siro Peruvian which had considerably better winter production than Hunter River.

After several years of commercialisation, concern was expressed at the short lived nature of these two cultivars, their economic life rarely exceeding 3-4 years except in light sandy situations where persistence was better than on heavy soils.

This prompted further work to seek a line of lucerne with all the desirable attributes of African and Siro Peruvian but with a considerable increase in the economic life of the stand.

Many years of work went into a programme of selection and comparative evaluation culminating in the registration and release of the cultivar Paravivo.

Development of Paravivo

Paravivo was derived by selection for persistence from within a population of the cultivar African.

The initial selection programme was conducted at the Parafield Plant Introduction Centre and comparative evaluation of lines was assessed in two experiments established in 1965 and 1966 respectively.

It was soon apparent that the three main attributes of African, viz better seedling vigour, better winter production and the ability to recover faster after cutting or grazing when compared with the cultivar Hunter River, had been incorporated in the new line.

Better seedling vigour

The inability of autumn sown Hunter River to establish and compete with weeds in the year of sowing has often resulted in thin stands or complete failure. Consequently spring sowing has become common practice in the higher rainfall lucerne growing areas of the State.

The development of African overcame this problem to a large extent and the retention of this characteristic in the new

cultivar Paravivo is most important.

As a measure of this early vigour in 1965 equal numbers of seedlings were cut and weighed twenty weeks after germination, Paravivo yielded 20% more dry matter than Hunter River, a significant increase in the year of establishment.

This increase in seedling vigour should allow a more successful establishment in competition with weeds, and also permit a worthwhile grazing return in the year of sowing, a factor not often possible with Hunter River.

Greater winter production

Over a six year period under a system of rotational grazing at Parafield, the mean dry matter production of Paravivo over the three months winter growing period was 37.5% greater than Hunter River. This difference in absolute figures, represented an additional 4.5 kg per hectare of dry matter per day.

The ability to compete better in the establishment year has also contributed towards better winter production in Paravivo in the year of an autumn sowing.

Examples have been cited of livestock having to be sold because of low winter production of Hunter River. This is often associated with late opening rains coinciding with low soil temperatures.

If the maintenance requirements of a dry sheep is approximately 750 grams of digestible organic matter per day and allowing for a 50% loss in effective utilisation, it can be seen that Paravivo with 4,500 grams of dry matter per hectare per day increase production over Hunter River represents an additional carrying capacity of 3 sheep per hectare during the winter period.

Even at a lower effective utilisation rate this can still mean the difference between holding sheep during a period of stress and low prices, or having to sell and rebuy later at higher prices.

This attribute alone makes Paravivo a worthy contender in any programme of lucerne sowing in the future.

Figure I illustrates the changes in winter production of Paravivo and African relative to Hunter River.

The effect of the lack of persistence in African was evident at an early stage in the experiment.

Although greater winter production than that of Hunter River is the main attribute of Paravivo, all season production has exceeded Hunter River as is shown in Table I. A significant contribution to greater annual production is also provided by a 25% increase in summer production but the yearly fluctuation in this production is largely dependant on summer rainfall.

The incidence of summer thunderstorms can greatly influence summer and autumn production.

Faster recovery after cutting or grazing

The ability of a plant to recover quickly after cutting for hay or grazing allows a more efficient utilisation of available moisture particularly during periods of higher temperature during summer and autumn.

Even during periods of low winter temperatures significant regrowth of Paravivo started 8-10 days before Hunter River. During periods of fodder shortage this can be an important attribute. However, being a plant with fewer stems and more erect habit than Hunter River, more attention must be paid to the grazing management of Paravivo.

Better persistence than African

It remained to establish that the selected line was more persistent than the cultivar African.

Hunter River has proved to be a very persistent cultivar over a large range of climatic and soil conditions in Australia and as a consequence is used as a 'measuring stick' when testing the persistence of new lines. However, it is relatively winter dormant.

It has been shown that African and Siro Peruvian are winter active cultivars but only have an economic life of about 3-4 years.

Better winter growth and longer stand life have been incorporated into Paravivo.

All lucerne stands lose plant density with time due to one or a combination of factors such as grazing and cultural mismanagement, drought, disease or lack of inherent longevity. However, it is the rate at which plant density is lost that is important in determining the economic life of a stand.

The annual changes in survival of the three cultivars in question are illustrated in Fig. II. The rate of decline in plant population by 1970 (fourth year) was such that African was quite inferior to Hunter River and plant populations continued to decline rapidly from then onwards.

Paravivo declined at about the same rate as Hunter River so that by 1974, Paravivo had maintained 15.5% and Hunter River 17.7% of their original plant populations. African had maintained only 2.5% of its original population.

Actual plant densities by this time were:-

Paravivo	6.92 per square metre
Hunter River	8.65 per square metre
African	0.74 per square metre

Both the Paravivo and Hunter River stands are still considered to be economic stands at this time, total production in the sixth year being 7,400 and 6,200 kg per hectare respectively.

The association of better plant survival and greater winter production has resulted in the annual production of Paravivo being 22% greater than Hunter River over a mean of six years and still 20% more productive in the sixth year.

This improved survival and its associated greater seasonal herbage production makes Paravivo a valuable cultivar of the future.

Alternative uses

Lucerne generally has long been recognised as a valuable grazing and hay crop and has recently gained recognition as a protein supplement for intensive meat production on both the local and export market.

The above data has been gathered under a system of rotational grazing with associated dry herbage measurements (similar to hay). Paravivo has performed exceptionally well.

In an attempt to demonstrate its potential as a 'protein supplement' in the form of dehydrated, compressed herbage commonly referred to as lucerne cubes, areas of both Paravivo and Hunter River lucerne were incorporated in a commercial cubing programme under irrigation in 1972.

Within six months of sowing three harvests were taken for cubing. Paravivo yielded 4,400 kg per hectare more than Hunter River which at current ruling prices of \$37.40 per tonne represents an increased return of \$164 a hectare, or a 25% increase over Hunter River.

Potential for seed production

Commercial seed yields of Paravivo under irrigation have exceeded 500 kg per hectare.

The current seed position is such that three areas in South Australia have produced sufficient seed to establish over 200 hectares for further seed production which should produce adequate seed to meet requirements for spring sowing in 1974.

Table I - Seasonal dry matter production of three cultivars of lucerne at Parafield, 1967-72

	<u>Mean of six years in kg per ha</u>				
	<u>Autumn</u>	<u>Winter</u>	<u>Spring</u>	<u>Summer</u>	<u>Annual</u>
Paravivo	966	1367	2098	1722	6152
% of Hunter River	113.8	137.5	115.9	125.1	122.3
African	755	950	1661	1521	4888
% of Hunter River	88.9	95.6	91.8	110.5	97.2
Hunter River	849	994	1810	1377	5030
	100.0	100.0	100.0	100.0	100.0

FIG. 1 ANNUAL WINTER PRODUCTION OF PARAVIVO AND AFRICAN RELATIVE TO HUNTER RIVER

(PARAFIELD 1967-72)

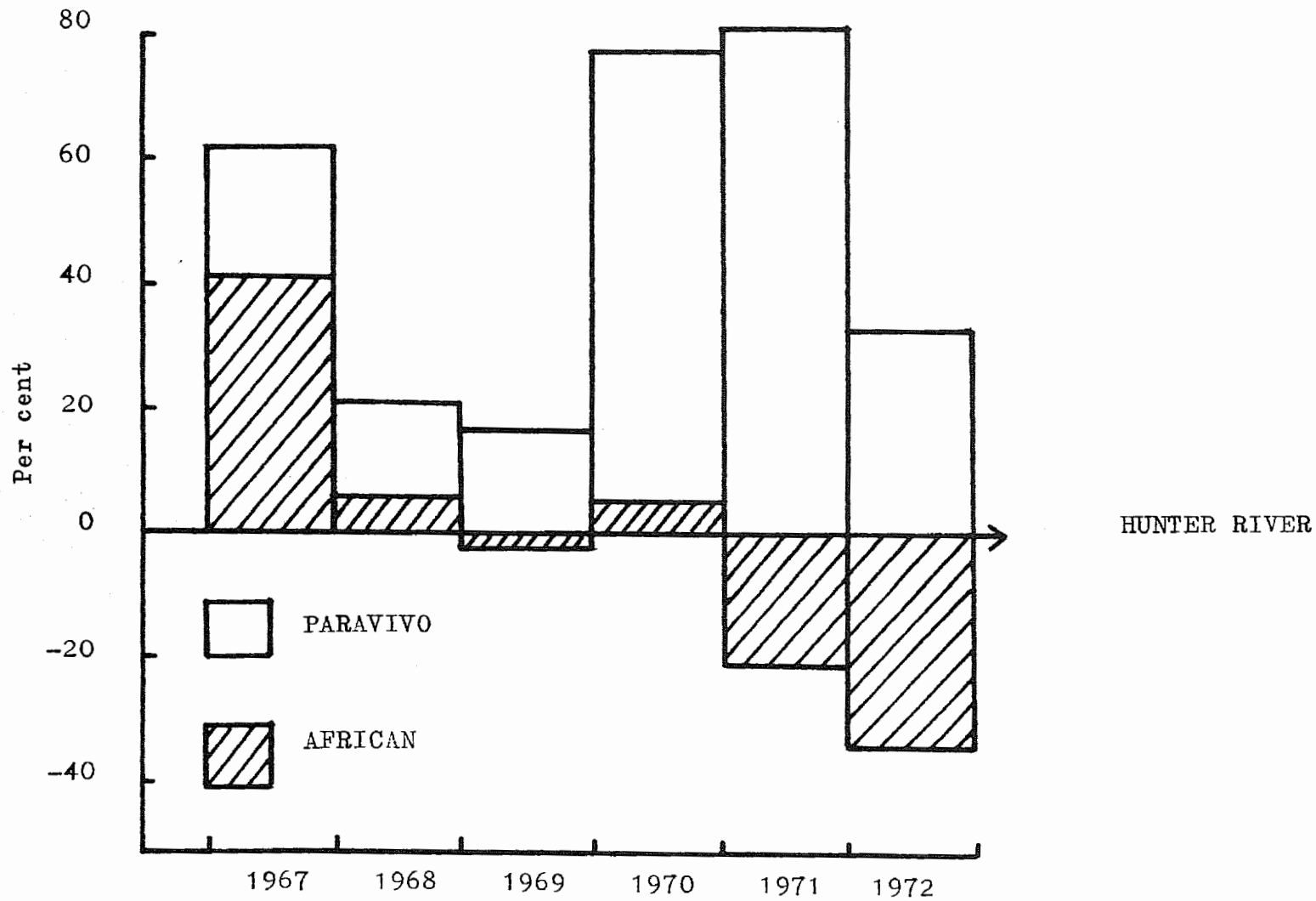


FIG. 2 ANNUAL CHANGES IN SURVIVAL OF THREE CULTIVARS OF LUCERNE

(PARAFIELD 1967-74)

