THE POTENTIAL OF WINTER RYE CULTIVARS IN THE GAUTENG PROVINCE OF SOUTH AFRICA

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ABSTRACT
Trials were conducted at the Hatfield Experimental Farm to evaluate eight rye cultivars (*Secale cereale*) in terms of production and development during different seasons. These consisted of a pot experiment, comparing two water regimes, and a field trial, comprising different planting dates, in order to observe phenological development. SSR 729, a South African winter rye, and imported cultivars compared favourably with the traditional cultivars. The winter rye cultivars are good substitutes for the "old" cultivars for the production of green forage in the autumn/winter period.

KEYWORDS
Autumn/winter grazing, dry matter production, green forage, phenological development, *Secale cereale*, winter rye

INTRODUCTION
In the Gauteng Province of South Africa, many farmers face a forage shortage in autumn - after the summer grasses have reached maturity and before the traditional winter pastures, eg. ryegrass (*Lolium multiflorum*), are ready to be grazed. Cereal crops such as oats (*Avena sativa*), triticale (*Triticale hexaploide*) and rye, are cultivated under both irrigated and dryland conditions to meet this need. Rye is increasingly being used in the colder regions of South Africa as it is more frost resistant than, for example, oats (Bruckner & Raymer, 1990). Most of the rye grown in South Africa has had the disadvantage of running to seed in autumn. It is then less acceptable to grazing animals. Following the success of the old "stooling" rye, a winter rye, SSR 729, was developed by a local seed company. This was compared with two other local and five imported rye cultivars. The objective was to evaluate the cultivars in terms of phenological development and dry matter production.

MATERIALS AND METHODS
Two trials were conducted in which the cultivars Bonel, Bates, Elbon, Oklon, Maton (imported from the Noble Foundation in Oklahoma, USA), SSR 1, SSR 727 and SSR 729 (local cultivars supplied by SENSAKO) were compared. The first comparison was conducted in growth cabinets and included an evaluation of two levels of soil water. The seeds were planted in 12*l* pots (3 replications), lined with plastic to facilitate control of the moisture status. A sandy loam soil was used. Upon reaching three leaf stage, the plants were thinned to 12 plants per pot and limestone ammonium nitrate (LAN) was applied @ 58 kg N ha^{-1}, after which the moisture treatments started. The field capacity (FC) of the soil was determined prior to planting. Moisture levels of 90% (A) and 60% (B) FC were maintained throughout the duration of the trial. Temperature and daylight length were adapted every five weeks to simulate conditions of summer, late summer, autumn, winter and spring. These ranged from 20 - 27 ½C (max. temp.), 4 - 15 ½C (min.temp.) and 10 - 12 h (day length).

When the most advanced cultivar reached a height of ± 30 cm, all the plants were harvested to a stubble height of 5 cm. After each harvest, each pot was again fertilized with 58 kg N ha^{-1}.

A small-scale field trial was conducted under irrigation to study the effect of planting date on the phenological development of the different cultivars. Seed was planted at six-week intervals starting in spring. The phenological development was observed every six weeks.

RESULTS AND DISCUSSION
Trial in growth cabinets. During the first and second halves of the growing season, yields obtained from treatment A were significantly higher than those from treatment B (P = 0.0001). SSR 729 yielded the highest, irrespective of treatment or growing season (Fig.1). It did not, however, differ significantly from Oklon, Elbon or Maton. No significant interaction was found between cultivar and moisture treatment. SSR 729 also had the highest tuft yield at the end of the growing season.

Field trial. At each of the planting dates SSR 1 was the first to become reproductive. The shortest period for any cultivar to start maturing was 6 weeks (SSR 1 planted on November 22 and January 3). The longest period was 28 weeks (SSR 729 planted on October 11). The imported cultivars, especially Elbon and Maton, compared favourably with SSR 729 in terms of late phenological development and vegetative growth. These results confirm the available information on the growth patterns of the different cultivars (Goodenough et al., 1993; Langenhoven et al., 1993; Botha et al., 1994; Kemp & Conradie, 1995). The best yields were obtained from SSR 729, Elbon, Maton and Oklon and confirm that SSR 729 can hold its own among established winter ryes. Because of the need for vernalization the winter ryes remain vegetative and thus leafy green forage is available for a longer period - eliminating the problem of a gap in fodder-flow. Winter-rye can be used under dryland conditions as well as irrigation, and as it is more frost resistant, makes a good winter forage in Gauteng.

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Figure 1
Dry matter yield of 8 rye cultivars (ls means)