The Effect of Planting Date on the Dry Matter Production of Italian and Westerwolds Ryegrass in the Southern Cape of South Africa

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Introduction

Perennial pasture species such as lucerne (*Medicago sativa*), kikuyu (*Pennisetum clandestinum*), perennial ryegrass (*Lolium perenne*) and perennial clovers (*Trifolium* spp.) make an important contribution to the fodder flow programmes for dairy production in the southern Cape. One of the main challenges when these species make up the primary pasture base within a pasture system is the mutually low growth rates during winter (Van Heerden *et al*., 1989; Swanepoel *et al*., 2014). In order to bridge pasture shortages during the critical winter months, producers establish annual Italian (*Lolium multiflorum* var. *italicum*) and Westerwolds ryegrass (*L. multiflorum* var. *westerwoldicum*) either as pure swards, mixtures or over-sown it into perennial pastures. The production potential and seasonal growth of annual ryegrass varieties are affected by climate and may not follow the same pattern of production as in other regions. The aim of this study was to determine the production potential of Italian and Westerwolds ryegrass planted at different planting dates in the southern Cape of South Africa.

Materials and Methods

The study was carried out as an irrigated small plot cutting trial on the Outeniqua Research Farm near George in the Western Cape Province of South Africa. Four cultivars of each of Italian and Westerwolds ryegrass were evaluated by sowing each cultivar in a factorial arrangement in a randomized complete block design every 28 days for two years. Planting dates and ryegrass types were specified as treatments which were randomized over the entire trial area and replicated twice as blocks. Plots were harvested with a sicklebar mower set to a height of 50 mm above ground level, approximately every 28 days or when the growing points of grasses were being over-shadowed to determine dry matter production of treatments. The ability of a treatment or plot to recover after a harvest was used as a criterion when terminating a treatment. The Shapiro-Wilk test was performed to test normality of residuals and the data was acceptably normally distributed with homogeneous variances (Shapiro and Wilk, 1965). An analysis of variance (ANOVA) was used to test for differences in herbage production between treatments. Means were separated using the student's t-test and the least significant difference (LSD) were calculated at a 5% level (Ott, 1993).

Results and Discussion

The total annual dry matter production of Italian and Westerwolds ryegrass planted at different planting dates is shown in Table 1.

Table 1: The annual DM production (t ha^{-1}) of Italian and Westerwolds ryegrass planted at different planting dates

	Planting date and total DM production											
	Dec	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
Italian ryegrass	8.5^{cde}	9.7^{ab}	10.1^{a}	9.9^{a}	8.7^{cd}	9.0^{bc}	8.2^{defg}	7.7^{fgh}	6.5^{ij}	5.5^{jk}	5.2^{lm}	3.9^{n}
Westerwolds ryegrass	7.6^{fgh}	7.0^{hi}	8.3^{def}	7.8^{efg}	6.7^{ij}	7.6^{gh}	7.0^{hi}	7.0^{hi}	6.0^{jk}	4.5^{mn}	3.7^{n}	4.1^{n}

(LSD (0.05) = 0.752, No common letter indicate a significant difference at P<0.05)

Planting date influenced the monthly growth rate and total production of both Italian and Westerwolds ryegrasses. The highest (P<0.05) and similar (P>0.05) to the highest total production was for Italian ryegrass established during Jan, February and March. For planting dates between December and June, Italian ryegrass was more productive than Westerwolds ryegrass. This was ascribed to the finding that the growth rate of Westerwolds showed a sharper decline from September onwards, while Italian ryegrass maintained higher growth rates until November. The trend for Italian

ryegrass to out-yield Westerwolds ryegrass during spring when established during autumn has been reported previously in both the southern Cape and KwaZulu-Natal regions of South Africa (Goodenough *et al*., 1987, Van der Colf and Botha 2013, Zulu *et al*., 2014). If the requirement of a fodder flow programme is to provide fodder from May until November, which includes the critical winter months (June, July and August), Italian ryegrass should be planted during February or March, based on number of cuts and total dry matter production. If the aim is production in spring and early summer (September to December), Italian ryegrass should be planted during May or June. The short productive periods and low total production for both ryegrass varieties when planted in spring (September, October and November), indicate that spring planting is not recommended in the southern Cape region. This is in contrast with findings that Italian ryegrass established during spring in KwaZulu-Natal could remain productive for up to 16 months after planting (Goodenough *et al*., 1984, Goodenough *et al*., 1987).

Conclusion

Italian ryegrass planted between December and June, is more productive than Westerwolds ryegrasses planted during the same period. Regardless of the variety, annual ryegrass should not be planted later than June. This will result in short productive periods (three to four months) and the annual production will be low. When ryegrass is established in pure swards, Italian ryegrass is a better option than Westerwolds ryegrass based on growth rate and annual production.

References

Goodenough, D.C.W., C.I. MacDonald and A.R.J. Morrison. 1984. Growth patterns of Italian ryegrass cultivars established in different seasons. *Journal of the Grassland Society of Southern Africa* 1: 21-24.

Goodenough D.C.W., A. Smith, M.F. Smith. 1987. The relative yield potential of westerwolds and Italian ryegrass cultivars in autumn-planted pastures and their flowering patterns following spring-establishment. *Journal of the Grassland Society of Southern Africa* 4: 35-39.

Ott, R. L. 1993. An Introduction to Statistical methods and data analysis. Belmont, California: Duxbury Press: pp 807-837 (pp 1-1051).

Shapiro, S.S. and M.B. Wilk. 1965. An Analysis of Variance Test for Normality (complete samples). *Biometrika* 52: 591-611.

Swanepoel, P.A., P.R. Botha, H.A. Snyman and C.C. du Preez. 2014. Impact of cultivation method on productivity and botanical composition of a kikuyu–ryegrass pasture. *African Journal of Range and Forage Science* 31**:** 215-220.

Van der Colf J. and P.R. Botha. 2013. The evaluation of annual ryegrass cultivars in the southern Cape. In: *Research Article Compilation Outeniqua Research Farm 2008-2013*. Western Cape Department of Agriculture. Elsenburg.

Van Heerden, J. M., N. M. Tainton and P. R. Botha. 1989. A comparison of grass and grass/legume pastures under irrigation in the Outeniqua area of the southern Cape. *Tydskrif Weidingsvereniging van Suid Afrika.* 6(4)**:** 220-224.

Zulu, L. B., J. van der Colf and P.R. Botha. 2014. The production potential of annual ryegrass cultivars in the southern Cape. In: Proceedings of the 49th Annual Congress of the Grassland Society of Southern Africa 97.