

Pasture irrigation

Irrigation guidelines for annual ryegrass pasture

Guidelines are now available from the WRC for the irrigation management of annual ryegrass management.

Pasture management

Ideal pasture management is the production of economically optimum forage yield and quality without compromising the environment. Accurate irrigation scheduling plays an important role in the income of an irrigation farm by affecting yield and quality of pasture; irrigation input and energy usage.

General rule for irrigated pastures

The generally accepted irrigation guideline for most temperate grasses, including ryegrass, is 25 mm of irrigation water per week regardless of season or region and does not take evaporative demand between locations and over time for a specific location into account. There is clearly a need to determine irrigation requirements of ryegrass by developing site-specific irrigation calendars which are simple guidelines or charts that indicate when and how much to irrigate.

Calendar-based irrigation scheduling provides irrigators with an inexpensive and convenient strategy to estimate irrigation timing and amount. The irrigation requirements developed can be flexible by deducting measured rainfall since the last irrigation event.

The objectives of this research were to determine water requirements of annual ryegrass and develop guidelines for efficient irrigation management of grass pastures.

Irrigation management

The most important aspects of irrigation management are:

- proper functioning of the irrigation system, e.g. uniform water application and the actual irrigation amount must match the amount the irrigator intended to apply;
- knowledge of crop water use and its sensitivity to water stress; and
- proper measurement of actual amounts of each rainfall and irrigation event.



Ryegrass is an important supplemental feed in dairy farming in South Africa.

The farmer can manage the soil water balance to his advantage by minimising wasteful losses such as runoff, evaporation and deep drainage. This will leave more water in the soil for crop uptake which is regarded as a beneficial use.

Irrigation scheduling is one of the most important management decisions on an irrigation farm. It is defined by when and how much water is applied. Farmers, to a large extent, are able to manage their water inputs. It is important to understand the different strategies that can be followed to ensure good soil water management including timing, amount and method of irrigation.

Soil Water Balance (SWB) model

During this project the SWB model was parameterised for annual ryegrass and its performance was evaluated under different levels of irrigation. The main strength of the model is that it requires fewer crop input parameters than the more detailed models but still predicts crop growth and soil water balance reasonably well. It can be used by farmers or consultants to develop their own irrigation calendars with relatively few simple inputs. The minimum inputs required for developing calendars are:

- weather station nearest to the farm;
- soil textural class;
- planting date and rooting depth; and
- irrigation management including irrigation system, timing and refill options.

Three versions of SWB model

The model has three versions:

- Irrigator or farmer version used by farmers to develop irrigation calendars;
- Consultant version is applicable for those who want to use their own user defined inputs (e.g. different soils in different layers) and/or simulate and display crop growth and soil water balance components; and
- Researcher version used by researchers for complex simulations pertaining to specific research questions. In this report the simple irrigator version is used to develop irrigation calendars.

Irrigation calendars

In the absence of irrigation scheduling tools, the irrigation calendars developed using a model, would be better than a rigid guideline of 25 mm a week. It needs to be stressed, however, that irrigation scheduling with the aid of real time modelling or measurements is better than calendars developed using a model. The model is available on the web and can be downloaded free of charge.

In the Irrigation Calendar screen of the Irrigator Version of the SWB model, new calendars can be created and generated; existing ones can be edited, viewed or deleted.

The mechanistic crop growth model cannot simulate mixed pastures which are commonly planted these days. Owing to differences in numbers, types and proportions of species in mixed pastures the use of an FAO approach would likely be a better option, until mixed pasture management is included in the model. However, for mixed pasture systems in which ryegrass is the dominant species, the model could still be used.

Future: Model calibration and testing

The SWB model needs to be calibrated and tested for newly planted and already established pastures. Interfaces and code for perennial/established pastures are under development. Hence data sets are required to test and refine the model for the most common irrigated pastures.

Further reading:

To obtain the report, *Irrigation Guidelines for Annual Ryegrass Pasture (Report No. TT 521/12)* (Report No. 1895/1/12), contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.