1987

Pasture agronomy branch, pasture growth rates.

P Booth

EXPERIMENTAL SUMMARY
1987

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PASTURE GROWTH RATES

Aim: To quantify and identify insect and fungal losses of annual pasture production caused through seedling mortality and early production losses.

Location:Three sites in the Margaret River/Augusta Shire, one in the Elgin Shire and one in the Bridgetown Shire were used.

Results:

Margaret River (1987)

Date Start	Stop	Noakes	Jenkins	Evans
		Kg/ha/day		
22/05/87	11/06/87	4.1	33.2	39.2
11/06/87	02/07/87	20.9	17.2	11.1
02/07/87	23/07/87	41.0	32.0	20.9
23/07/87	13/08/87	22.3	41.9	18.8
13/08/87	03/09/87	15.5	34.6	24.0
03/09/87	24/09/87	20.2	24.3	49.7
24/09/87	15/10/87	25.4	110.2	67.1
15/10/87	05/11/87	53.3		85.8

Soil Type Description

Noakes	Sandy loam
Jenkins	Gravel clay
Evans	Clay loam

Bridgetown (1987)

Date	High Management	Low Management
	Kg/ha/day	
June 8	0	0
July 16	63	53
August 25	34	30
September 22	64	49
October 20	35	12

Comments:The growth rates presented are the average of all treatments as there were no significant differences recorded.

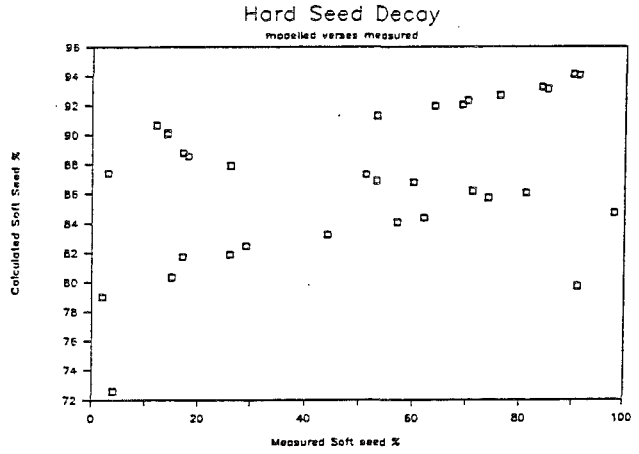
Meteorological data were recorded on site and the absence of treatment effects appear to be consistent with responses based on weather data.

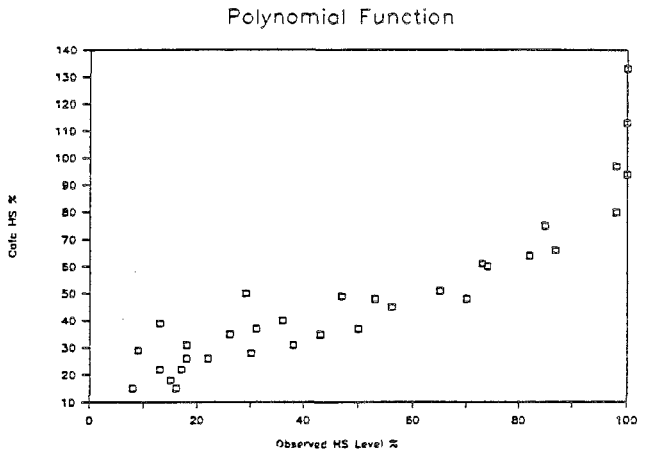
HARD SEED DECAY

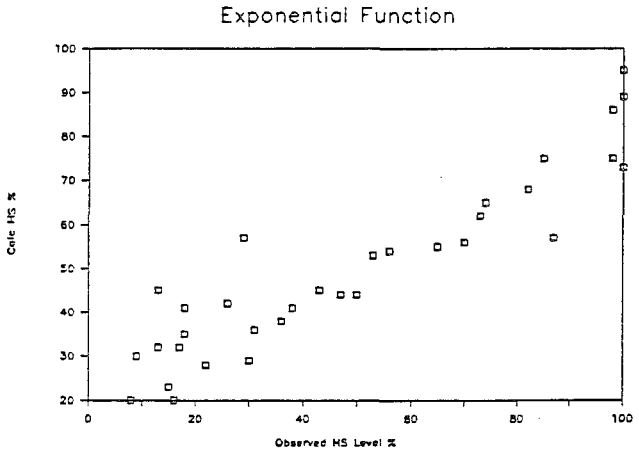
The initialization of annual pasture models for a year's run requires either seed data or green biomass to allow further pasture growth to be calculated. The only attempt to define the decay of hardseededness is that of Galbraith et al. (1980). This attempt uses a quadratic relationship between maximum soil temperature and the rate of decay.

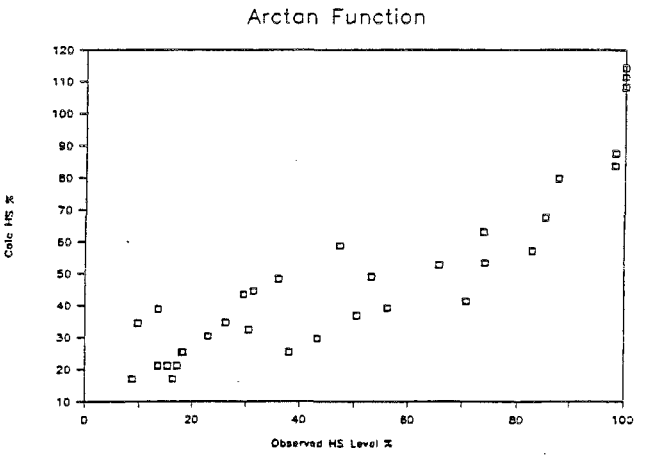
Data of Taylor (1981) shows a poor relationship between the calculated and observed decay.

Polynomial, exponential and arctan curves were fitted (graphs 2,3,4) with the arctan curve giving the best fit between observed and calculated data. The arctan curve coefficients also have the advantage of being able to be interpreted in a biological sense.









Galbraith, K.A.,Arnold, G.W., Carbon, B.,A. (1980) Dynamics of plant and animal production of a Subterranian clover pasture grazed by sheep: Part2-Structure and validation of pasture growth model. Ag Systems 6:22-43.

Taylor, G.B. (1981) Effects of constant temperature treatments followed by fluctuating temperatures on softening of hard seeds of Trofolium subterraneum L. Aust J Plant Physiolog 8:547-58.

SOIL WATER LOSS

Pasture establishment in autunm occurs during cycles of soil drying following rain. A large proportion of the rain is lost through evaporation. Ritchie (1972) published a model of a two stage drying system that behaved adequately for crops, was comparatively simple and was able to be calibrated using one soil drying cycle.

To calibrate the model for local soils 600x300x200mm boxes were filled with relatively undisturbed surface soil from each of 4 sites where pasture re-establishment was being measured. The 4 soils were Bridgetown gravelly loam, an Elgin clay loam, an Elgin sand and a Margaret River sandy loam. The boxes were weighed each day and the first drying cycle used (not graphed) to estimate the limit the first stage of drying (during which soil evaporation is linearly related to potential evaporation) and the coefficient of curvature for the non-linear phase.

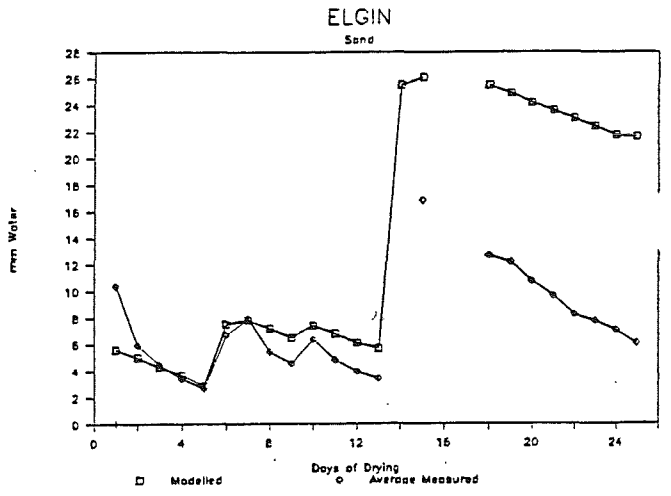
Results

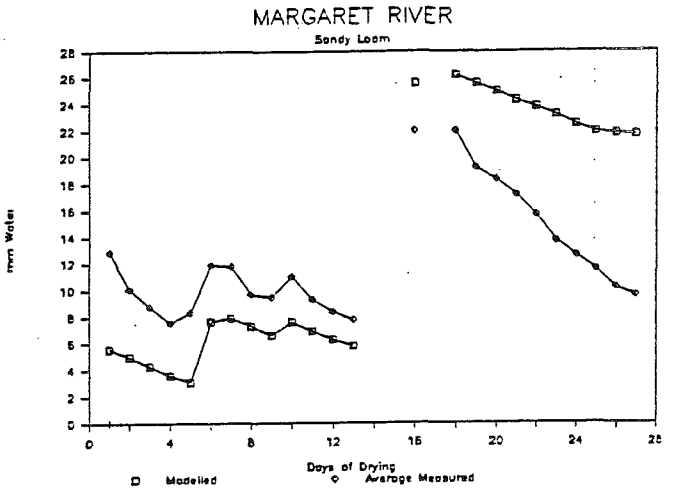
The coeffecients obtained are in table 1.

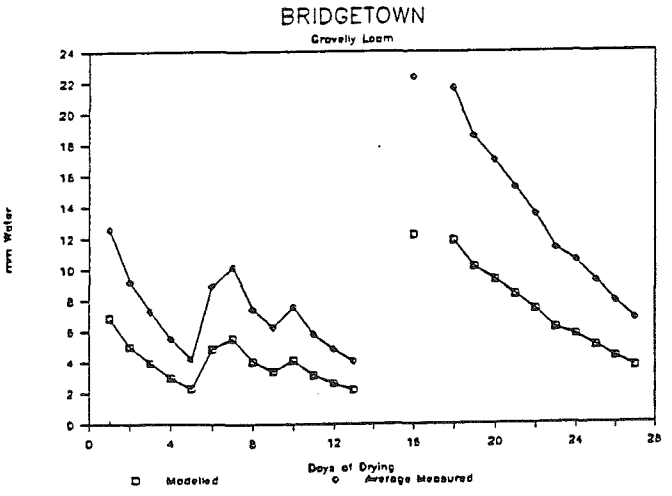
Table 1.

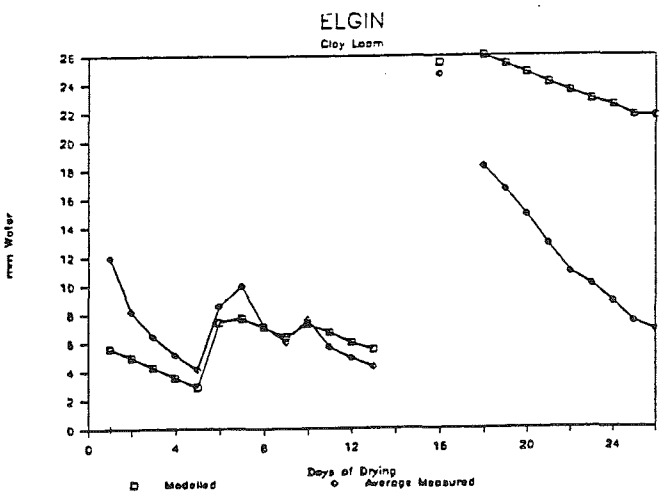
Soil Type	Linear Limit	Curviture Coeficient
Sand	2.5	2.16
Sandy Loam	2.8	1.68
Gravelly Loam	0	4.01
Clay Loam	3.9	1.98

The graphed model and recorded drying cyles are contained in figures 1-4.









Comments

The graphs show the modelled behavior is similar in shape to the measured weight change of the boxes, the large translocation of the modelled data following the large rain fall (day 18) is due to the limitted capacity of the boxes, with some of the rain draining through and thereby shifting the curve down whilst maintaining its shape.

Ritchie, J.,T. (1975) Model for predicting evaporation from a row crop with incomplete cover. Water resources research 8(5):1204-1213.