THE EFFECTS OF FIRE ON LITTER DECOMPOSITION AND ON THE SOIL FAUNA IN A PINUS PINASTER PLANTATION.

by

J.A. Springett.

ABSTRACT.

Controlled fires are used in forest management programmes. Their effects on decomposition in Pinus pinaster litter has been estimated by using 10 cm x 30 cm strips of unbleached calico buried in the soil to measure the relative decomposition rates in burnt and unburnt areas. The soil microarthropods in the two areas were compared. Detailed taxonomic information was not available for most groups and so attributes such as feeding habits and the presence of food in the gut were used to classify individuals.

The results showed that although the population densities and the proportion of mites to collemboles did not differ on the two areas the decomposition rate was reduced on the burnt area. The proportion of fungal feeders was less as was the proportion of animals with visible gut contents. This may indicate a lower rate of fungal decomposition in the burnt area. The lower numbers of animals with visible gut contents on the burnt area could be an indication of reduced feeding activity or it could reflect a change in the type of food eaten as bacterial food is not easily visible in the gut.

It is possible that fire has produced a change in the physical or chemical properties of the soil litter which favours bacterial rather than fungal decomposition. If this is so and is reproducible in other forest types, it can be seen that controlled burning may be capable of making a fundamental change in the energy pathways in the forest ecosystem.

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(Editors' Note: This work was carried out in Western Australia where Dr. Springett is under contract to the Forests Department to carry out Soil Zoological Studies of litter decomposition, mainly in Pinus pinaster. She is also helping the study of the ecology of the Noisy Scrub Bird by carrying out special litter studies pertinent to the bird's habitat and feeding habits.)

AN EFFECT OF BURNING ON JARRAH SCRUB REGENERATION

by

J. McCormick.

It is one thing to control-burn large forest areas but quite another to predict the long term effect that prolonged cyclic burning will have on the native flora. In recent years pronounced changes in the plant population occurred in Dwellingup division when the aftermath of the 1961 wildfire produced large areas of dense fireweed species which in turn have been almost completely removed by controlled burning.

To study the effect of controlled burning on these fireweeds, a small trial was established in Wilson block in 1968. The three major scrub species tested were Acacia pulchella, Acacia strigosa and Bossiaea aquifolium which grew to a height of 4'6" and had a cover density of 80%. In each species-area a one square chain plot was established in which 25 fixed 2 x 2 ft. quadrats were assessed for genera and species numerical dominance before and after controlled burning and areal dominance after burning (re tables). The plots were treated with a controlled burn of 20 B.T.U.'s intensity in mid November 1968. All major scrub plants were either scorched or defoliated in the burn. The effect of burning on major plot species numbers was

	Before burning	(18 months) After burning
Acacia pulchella	95	4
Acacia strigosa	252	11
Bossiaea aquifolium	220	12

Most of the major species after burn plants were of new seedling growth. The total plant population was reduced by 40%, whereas the number of lower strata species was reduced by 9%, only.

The effect of controlled burning on some individual genera and species is recorded:—

Leguminoseae — The most pronounced effect of burning was on leguminous plants which showed a marked loss in numerical and areal dominance over all other genera (re tables).

Proteaceae — Achieved areal dominance after burning.

Papilionaceae — Upper strata species Bossiaea aquifolium was replaced in dominance by lower strata papilionates.

Rhamnaceae — Trymalium ledifolium appeared to germinate profusely and estahlish itself readily, whereas T.spathulatum, a plant generally found in more moist areas was eliminated by the burning.

Myrtaceae	Eucalypt seedlings were reduced in number by 50% by burning but removal of upper strata plants led to good areal dominance.
Orchidaceae	Orchids appear to grow profusely in the burnt plots.
Rubiaceae	Opercularias indicate good seedling regeneration.
Epacridaceae	Good regeneration of Leucopogon capitillatus was observed.
Steruliaceae	Lasiopetalum floribundum introduced since burning and now has considerable areal importance.

Species common to the general area among the families – Goodeniaceae, Dilleniaceae, Apiaceae, Amaryllidaceae etc. show little dynamic variation as a result of the burning treatment.

It is evident from the trial that perennial plants with rhizomous or more pronounced root systems will better withstand controlled burning than tall perennial plants with sparse root systems grown rapidly from seed, e.g. the three major species considered in the trial. It is therefore reasonable to surmise that in the event of cyclic four to five year controlled burning the perennial plants more likely to become dominant will be those which can best establish a pronounced root system within the given time, thus species dominance will be governed to a large extent by periodicity of burning and fire intensity.

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Plant Families in Order of Numerical Importance

B		A	
Leguminosae	347	Apiaceae	179
Papilionaceae	293	Goodeniaceae	109
Apiaceae	203	Rhamnaceae	80
Goodeniaceae	143	Orchidaceae	69
Rhamnaceae	108	Papilionaceae	67
Proteaceae	82	Proteaceae	57
Myrtaceae	54	Rubiaceae	50
Dilleniaceae	43	Dilleniaceae	35
Ranunculaceae	34	Ranunculaceae	35
Rutaceae	30	Epacridaceae	29
Tremendraceae	29	Myrtaceae	26
Stylidiaceae	28	Tremandaceae	22
Orchidaceae	19	Stylidiaceae	20
Amaryllidaceae	13	Steruliaceae	20
Liliaceae	12	Liliaceae	19
Pittosporaceae	11	Rutaceae	17

Restionaceae	9	Leguminoseae	15
Droseraceae	4	Amaryllidaceae	12
Epacridaceae	4	Restionaceae	12
Iridaceae	2	Droseraceae	8
Rubiaceae	2	Cycadaceae	2
Cycadaceae	1	Iridaceae	1
Steruliaceae	0	Pittospermaceae	0

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Plant Families in Order of Areal Importance

A	Sq.ft.
Proteaceae	13.99
Liliaceae	10.10
Myrtaceae	10.05
Steruliaceae	4.17
Papilionaceae	3.77
Grass type sp.	3.48
Dilleniaceae	2.76
Rutaceae	0.98
Cycadaceae	0.94
Apiaceae	0.94
Epacridaceae	0.79
Goodeniaceae	0.77
Restionaceae	0.60
Ranunculaceae	0.47
Rhamnaceae	0.37
Amaryllidaceae	0.23
Rubiaceae	0.21
Orchidaceae	0.19
Stylidaceae	0.15
Tremandraceae	0.14
Iridaceae	0.14
Leguminosae	0.08
Droseraceae	0.05
Pittospermaceae	0.00