

35% of water soluble potash and about 2% of phosphoric acid, in addition to other ingredients like calcium (2%) carbonates (13%) Magnesium (2%) Sodium chloride (23%) etc.

Further as the result of an interesting experiment, in which coconut husks were ashed before and after retting them, it was found that as much as 50% of the potash present in the husk, was lost during retting, (ie.) by mere solution in the retting water. The author therefore advises that where husks have to be ashed for use as a manure, they must be husked when they are fresh and not after undue exposure, as monsoon rains received during the period of storing the husks in a corner of the garden, are likely to leach out the soluble potash.

The author computes that according as the soil is loamy or gravelly the yield of potash from 1000 husks, will vary from 10 to 15 lbs. M. R. B.

Review.

Principles of Forest Entomology: By S. A. Graham. Pages 1-339 (with figures) 1929 (First Edition). Published by *Mc Graw-Hill Book Company Inc.*, New York and London.

This book forms one among a series of *Mc Graw-Hill* publications in the Zoological Sciences edited by A. Franklin Shull; and is intended for all interested in the protection of forests and forest products.

The subject matter of the book is divided into 17 chapters as follows:—
Chapter I. Introduction wherein the author deals with the importance of forest entomology, losses due to forest insects, scope and sub-divisions of forest entomology; *Chapter II.* Historical review of the development of Forest Entomology in Europe and in America; *Chapter III.* Biotic Potential dealing with rate of multiplication, sex-ratio and calculation of Biotic Potential; *Chapter IV.* Environmental resistance such as physical factors, nutritional factors, plant physiological factors, and biotic factors; *Chapter V.* Insect abundance dealing with biotic balance and devices to increase abundance; *Chapter VI.* Direct control of tree insects dealing with purpose and cost of control and classification of control measures, direct control by biotic methods; *Chapter VII.* Direct control by chemical methods dealing with feasibility of chemical methods, application of insecticides and the classification of insecticides; *Chapter VIII.* Indirect control of tree insects dealing with control by modification of food-supply, modification of moisture conditions, and modification of temperature; *Chapter IX.* Indirect biotic methods and silvicultural practices dealing with indirect biotic methods such as the use of competition, control by parasites and by predators and silvicultural practices; *Chapter X.* Leaf eating insects dealing with defoliation, Lepidopterous leaf eaters, Coleopterous leaf eaters and Hymenopterous leaf eaters; *Chapter XI.* Meristem insects of the terminal parts dealing with groups of meristem insects, insects feeding on the tips and feeding on the roots; *Chapter XII.* Meristem insects of the cambium region dealing with cambium borers and bark beetles; *Chapter XIII.* Cambium-wood insects viz., pests of living trees and pests of drying trees and logs; *Chapter XIV.* Wood destroyers such as unseasoned wood insects, moist dead-wood insects, marine wood borers and dry wood insects; *Chapter XV.* Sapsucking insects such as Hemipterous insects, some Homopterous insects and scale-insects; *Chapter XVI.* Insectivorous parasites such as entomophagous micro-organisms and parasitic insects; *Chapter XVII.* Insectivorous predators viz., predatory insects and other predators.

At the end there is an exhaustive bibliography (pages 306—317) given chapter by chapter, about 300 references in all. And there is an index running from pages 319—339.

The author himself says at the outset in the preface that the book instead of being primarily a text book "should be of interest not only to students and teachers of forest entomology, but also, to economic entomologists, ecologists, foresters..... The book does not in any way deal with classification, structure, anatomy, metamorphosis etc., as a text book usually does, but deals on some broad principles on which economic entomology is based from an ecological point of view "supplemented by a study of certain insect species carefully selected to illustrate how these principles apply in individual instances". Even from a run at the subject dealt with in the several chapters it can be seen that the book is more or less of a general nature and consequently forms a convenient hand book for an economic entomologist, whether he be a forest entomologist or one who has to deal with agricultural crop-pests. And it can form a companion volume to Folsom and Wardle's "Entomology with reference to its Ecological Aspects."

The following insects are dealt with in the course of the work viz; the Spruce Bud-worm the gypsy Moth, the cankerworms, the Elm Leaf beetle, the poplar Leaf beetle, the Larch saw-fly and the pine sawflies among the leaf eating insects; the Pine Tip moth, the Pales weevil, the white pine weevil, the white gribbs and other small root insects among the meristem insects of the terminal parts. The pine Pitch mass borer, the sugar maple borer, the two lined borer, other species of *Agrilus* among the cambium borers and the Black Hills beetle and the pine Bark beetle among the bark beetles; the Locust borer, the Aspen borer and the carpenter moth, among pests of living trees and the flat headed borer and the small pine sawyer among the pests of drying trees and logs; the Ambrosia beetles and Horntails among the unseasoned wood insects, the carpenter Ant and the *parandra* borer among the moist dead wood insects; the shipworms and the wood Louse among the marine wood borers; and the Termites and the powder post beetles among the dry wood insects; the plant bugs and the Lace bugs among the Hemipterous insects; the periodical cicada, the Aphids and the Adelgids among Homopterous insects; and the Oyster-shell scale, the cottony Maple-scale and the European Elm-scale among the scale insects.

One interesting feature in the book is that beginning from chapter X, dealing with the different kinds of insects, at the end of each insect under reference, are found questions on literature pertaining to such points as the outbreak of the pest, food plants, secondary insect pests usually associated with the primary one, the period of attack on the tree, nature and extent of attack, susceptibility to or resistance from injury, introduction of parasites and their establishing, important parasites met with, control measures such as spraying, tree banding whether the pest is indigenous or otherwise, geographical distribution, environmental factors, biotic potential, the different broods, details as regards life-cycle which have got a bearing on controlling the insect pest. The questions in themselves would suggest the lines on which any insect problem can be tackled.

The chapters on biotic potential, environmental resistance, insect abundance, and those dealing on control methods are very illuminatingly written in such a small compass. While dealing with other indirect control measures the author gives a short account on 'control by parasites' and the portion is worth reading, for he has brought in a nutshell the different aspects of biological control and adduces the several factors on which the effectiveness of a parasite in controlling insect pests depends. And in order that a given parasite may be effective its requirements have been summed up thus "it should have a high biotic potential; it should be synchronized with its host in such a way that the adult parasites are flying during the time when the susceptible state of the host is available; it should be able to feed upon more than one species of host; it

should not be restricted in its multiplication by the necessity of spending an alternate generation in a host that does not occur abundantly; it should be able to compete successfully with other parasites when double parasitism occurs; finally it should be able to reach and parasitize a large proportion of the potential hosts.

He makes an interesting observation to the effect that "The success of fungus and bacterial diseases in reducing insect abundance depends so much upon favourable weather conditions that the use of these organisms offers comparatively little promise at the present time."

The get up of the book is on a par with other publications in the same series.
V. M.

Research Notes.

The Occurrence and Inheritance of Yellow Coloured Anthers in the Italian Millet—*Setaria italica* (Beauv).

In *Setaria italica* two fresh anther colours are met with, viz., brownish-orange and white. These, when dry and seen *en masse* appear brownish-black and buff-yellow respectively. These colours form a simple Mendelian pair, with orange dominant (G. N. Rangaswami Ayyangar and T. R. Narayanan, 1932, Ind. J. Agric. Sci. 2: 59).

In the course of further work yellow coloured anthers (drying brown) have been met with in the following varieties :--

Number.	
S. I. 102	... From India.
S. I. 2657	... " Russia.
M. S. 3422	... " China.

The relationship of these yellow coloured anthers to the other colours, brownish-orange and white, has been determined by suitable crosses.

TABLE I.

Yellow anther X Brownish-orange anther, F₁—Brownish-orange anther.

Cross No.	F ₂ Family No.	Segregation for	
		Brownish-orange anther.	Yellow anther.
(S. I. 102 × S. I. 419)	S. I. CCCLXXXIX		
	S. I. CCCXCI	S. I. 2679	216
		S. I. 2680	187
		S. I. 2681	191
(S. I. 2657 × S. I. 2120)	S. I. CCCXCII	S. I. 2682	184
	S. I. CCCXCH	S. I. 2683	138
		Total	916
		Expected 3:1	940.5
			313.5

$$\chi^2 = 2.6 \quad P > .05$$