FIELD RELEASE OF THE NOOGOORA BURR INSECTS, MECAS AND NUPSERHA

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The overseas exploration of *Mecas* and *Nupserha*, their testing for host specificity, and their early releases were discussed by the author at the Australian Weeds Conference 1965.

Both species, and particularly *Mecas*, have proved difficult to rear in cages in large numbers, as each individual insect requires an actively growing plant for its development and only one larva per stem survive; mortality in the stems is high. Use of an artificial diet for larval development is now showing considerable promise.

In nearly every case field establishment following liberation has been set back by a series of years of patchy rainfall which has resulted in irregular germination of noogoora burr; in some areas no germination has been reported.

Total *Mecas* adults released in the field is now 1,750 most of them at three sites. Survival has been observed at Roma and Rockhampton and establishment is possible at the former site; however, field populations have remained low and continued survival seems uncertain at the latter. Future liberations in coastal areas with a more reliable rainfall pattern are projected.

The position with *Nupserha* is more promising as establishment now appears certain at three of the nineteen release sites (total 10,000 adults), and at five, survival for more than one field generation has occurred. At a further five sites releases are too recent for any judgment of survival to be made.

The value of *Nupserha* as a biological control agent is still a matter for conjecture but evidence of its acclimatization to Australian conditions is becoming more apparent.

The most advanced establishment is at a site near Alpha where population growth has been steady since the release of 266 adults in January 1966, notwithstanding a severe drought in 1968-1969. Dispersal for more than a mile has been recorded and establishment is now known over an area well in excess of 100 acres of what is usually dense burr (between 50 and 150 plants per square yard). Samples taken during the 1969-70 summer indicated that an average of 2-3 stems per square yard were attacked, giving an estimated *Nupserha* population in the neighbourhood of 1.5 million. Observations after fruiting was complete showed that either most attacked plants did not bear seed or seeding was drastically reduced (2-3 seeds against a minimum of 30 on adjoining unattacked plants).

At the present rate of increase a true indication of this insect's value should be apparent at this site within the next two summer seasons.

CONTROL OF PASTURE WEEDS BY GRAZING MANAGEMENT

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Herbicides have long been used to restore the balance between sown pasture species and weedy invaders. The long-term implications of this practice are not known but it is certain that alternative, non-chemical methods should be sought. In this paper we consider the ecological approach to weed control using as examples four common weeds of irrigated pastures.

Barley grass (*Hordeum leporinum*) was controlled by grazing management in irrigated annual pastures at Deniliquin, New South Wales. Deferment of grazing for 20 days after the opening autumn irrigation was followed by continuous stocking with Merino wethers at 8 sheep per acre. Density of barley grass seedlings was reduced from 2,080 per sq metre to 37 per sq metre within 12 months. The contrasting germination behaviour of barley grass and subterranean clover and the diet selectivity of sheep (as determined by oesophageal fistulae) were exploited to control the barley grass (Myers and Squires, 1970).

Thistles are commonly troublesome in irrigated annual pastures based on subterranean clover. In a grazing experiment at Deniliquin we observed that thistles (*Cirsium* spp.) invaded plots set stocked at low levels (5 sheep per acre). Areas set stocked at higher rates (7 or 10 per acre) were free from serious invasion. The sheep at the higher stocking rates were observed to graze the thistle after senescence and reduce them to woody stumps.

Rushes (*Juncus* spp.) can be a serious problem in irrigated permanent pastures based on *Paspalum dilatatum* and *Trifolium repens*. An established pasture was set stocked at high rates in summer (November-March) and lightly stocked in winter