Forty years of weeds and seeds

G R W Meadly

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Mr. Meadly examines a clover variety

Forty Years of
"Weeds and Seeds"

The Chief of the Department of Agriculture's Biological Services Division, Mr. G. R. W. Meadly, retired on November 12, after more than 40 years with the Department.

Mr. Meadly who has an international reputation for his work in weed control and seed certification, was Officer-in-Charge of the Department's Seed Certification and Weed Control Branch from 1950 to early 1972, when he was appointed Chief of the Biological Services Division.

Raised on his father's farm near Merredin, Mr. Meadly joined the Department of Agriculture in 1931, after completing a degree in science at the University of W.A. Shortly afterwards he was awarded a Master's degree for research on pasture deterioration.

One of his early achievements was to organise for Western Australia one of the first seed certification schemes in Australia. This was in 1934. He also carried out research on pasture seed quality and production which helped lay the foundations for the State's present efficient pasture seed industry.

Mr. Meadly has taken an active part in the work of the International Seed Testing Association and has been a member of its executive since 1968.

But in Western Australia he is best known as an expert on weed control, especially as the author of the standard reference handbook "Weeds of Western Australia".

He carried out the first research in Western Australia on the use of the hormone-like herbicides which are now used to spray more than a million hectares of cereal crop each year.

When the Agriculture Protection Board was established in 1950 he was responsible for establishing and administering the Board's weed control activities. He continued in this role until the Board appointed separate weed control staff of its own several years ago.

As the need for controls in weed spraying and seed production arose, he took a leading part in developing the Seeds Act, the Aerial Spraying Control Act, and the Agriculture Protection Board Act.

He is past president of the Royal Society of Western Australia and the W.A. Branch of the Australian Institute of Agricultural Science.

Aerial operators played an important part in the development of spraying for weed control

One of the first cereal crops sprayed with 2, 4-D. Dense growth of wild radish in an unsprayed strip indicates the success of the treatment

Sheep-skin rollers brought a big advance in subterranean clover seed harvesting. They have now been replaced by more sophisticated machines
PROGRESS IN WEED CONTROL

Until 1950, responsibility for ensuring that noxious weeds were controlled rested with local authorities. Understandably, Road Boards as they were then known, did not employ people conversant with technical aspects of control, funds were usually limited and there was a natural reluctance to apply pressure to local farmers, particularly when large areas entailing considerable cost were involved.

The Agriculture Protection Board

Largely as a result of a Royal Commission, legislation was passed in 1950 to create an Agriculture Protection Board with responsibility for ensuring that action was taken against noxious weeds. Farmers, local authorities and Government Departments were required to carry out the work on land under their control, with the Protection Board having authority to declare weeds as noxious and enforce measures it considered necessary.

The Board encompassed both vermin and noxious weeds. It took over from the Department of Agriculture an established unit dealing with vermin but an entirely new organisation was required for weed control.

The establishment of the Board enabled weed control activities to be co-ordinated and protective measures taken, particularly in relation to importations such as stock, fodder and used sacks, woolpacks and machinery.

Farmers and local authorities are strongly represented, ensuring that a practical viewpoint is maintained.

Weed technology

Creation of the Board and amendments to the Noxious Weeds Act represented a major administrative step forward, which has been matched in the field of weed technology.

In 1950 I was the only officer of the Department working on weed control—as well as having other duties. Today, the Department has a highly qualified group of weed specialists who have achieved a great deal of success with a very wide range of weed pests.

The value of cultivation for weed control has been known almost since agriculture began. With correct timing it can be used to stimulate germination of weeds seeds, destroy seedlings and prevent seed formation.

Before 1950, chemicals were used to only a limited extent for weed control in this State. Arsenic pentoxide was helpful for killing green timber and arsenicals and sodium chlorate were used in situations where total herbage control was required.

New herbicides

A dramatic change took place in the early 1950s. The growth regulating or hormone-like herbicides, now generally known as 2, 4-D, were developed during the war and were intended for the destruction of enemy crops.

As soon as material became available, research carried out in Western Australia demonstrated the remarkable properties of these chemicals under our conditions. It was found possible to kill wild turnip with as little as 140 g of 2, 4-D per hectare.

Other cruciferous weeds such as wild radish and mustard were also killed quite readily with somewhat higher rates of 2, 4-D but it was not very effective against doublegee, one of our most widespread and troublesome weeds.

Investigations were continued with herbicides formulated by the large chemical firms and a breakthrough with doublegee was achieved with dicamba, to be followed soon afterwards by linuron and bromoxynil.

Chemicals formulated for other weed problems have been rapidly tested by the Department and their best application rates determined, allowing early and effective adoption by farmers.

Accurate figures are not available but it is estimated that about one million hectares of cereals are now sprayed each year in Western Australia for the control of weeds. It is a standard farming practice and little thought is given to the time, not so long ago, when weeds such as wild turnip, wild radish, saffron thistle and doublegee took a heavy toll of crop yields—and nothing could be done after the crop had been sown.

Spectacular development in cereal crop spraying was made possible by improvements in ground equipment to enable low volumes to be applied and extensive use of aircraft. The aerial operators must be given full credit for the part they have played.

Weed ecology

Local advances in weed control have not been restricted to the use of chemical herbicides. Investigation of the life history and ecology of weeds allows techniques to be developed which ensure that control measures have the greatest possible impact.

For example, it is important to know the growth stage at which a perennial plant such as blackberry is most susceptible to 2, 4, 5-T and over what period saffron thistle can be expected to germinate in various districts; what proportion of Cape turnip corms and cormils remain dormant and what factors influence the breaking of dormancy. Results of such studies have enabled known control measures to be used more effectively and economically.

Attention has also been given to agronomic aspects—the relationship between weeds, pasture plants and the grazing animal. Weeds can be suppressed by creating an environment more favourable for the crop or pasture than the weeds themselves, and the grazing factor can be used to advantage.

The spray-graze technique developed in Western Australia relies on heavy grazing following the application of a sub-lethal dose of herbicide, thus reducing the cost and also the effect of the herbicide on pasture species.

Biological control

In recent years considerable attention has been given to biological control, particularly by CSIRO.

Encouraging results are being obtained with skeleton weed following the release of a rust fungus introduced from France. This is regarded as a means of control rather than eradication and cannot be considered an answer to our present skeleton weed problems.

Only recently, in cooperation with CSIRO, weevils from South Africa were released in the wheat-
belt to assess their value in the control of doublegeese.

Many other advances in weed control made in the last few decades could be mentioned. This is a fascinating study, the importance of which is now fully recognised. Weed problems will continue to be with us but we are far better equipped to deal with them now than we were 40 years ago.

DEVELOPMENT OF THE SEED INDUSTRY

It is recorded that in 1901 Australia produced 4,506 lb “grass seed” while in 1962-63, 11,386 tons of pasture seeds were harvested, reaching 23,000 tons by 1967. In 1934/35 the first year of certification in Western Australia, 70 tons of Dwalganup subterranean clover was sealed. In 1968/69, the peak year for pasture legume production in this State, some 12,000 tons of subterranean clover and med’c seed was produced, including 7,000 tons of certified subterranean clover.

Factors contributing to the development of the local industry include improvements in harvesting and cleaning equipment, favourable conditions for growing and harvesting subterranean clover and medics, development of superior cultivars, early introduction of seed certification and availability of efficient testing facilities.

Harvesting innovations

Probably the greatest stimulus was given by harvesting innovations. Subterranean clover burrs were first gathered in South Australia by Mr A. W. Howard in 1907, 153 pounds of seed being cleaned during the season. Initially, gathering was carried out with wide hand rakes but this tedious method was soon replaced by a type of hay rake supplemented by a rotating broom similar to a road broom.

About 1930, sheep skin rollers became the accepted method of harvesting subterranean clover in Western Australia.

Following the removal of top growth by raking or burning, buried burrs were lifted and exposed by pasture harrows or a scarifier. They were then picked up by a sheepskin-covered roller and scraped or brushed into an attached hopper. At first a single roller was drawn by a horse but later, gangs were attached to a tractor.

It was soon found that threshers could be operated in conjunction with rollers and an effective combine harvester was the result. Over a period of years producers and engineers with inventive capacity designed a number of machines incorporating new ideas including blowing and suction. Machines employing these principles are now widely used and have enabled seed to be produced much more cheaply.

Comparable improvements have been made with threshing and grading equipment. For many years spiral graders were used to remove such things as grit and small stones. These have been replaced by the much more efficient and sophisticated gravity table.

Subterranean clover

Natural conditions have played an important part in making Western Australia the main producer of subterranean clover and medics.

With extensive agricultural development following the war, new areas of land were available for sowing, thus helping to maintain large pure stands of various cultivars. Most of the soil was of a light nature, such as on the Esperance plain, making it highly suitable for gathering subterranean clover. Harvesting is also favoured by the well-defined rainy season followed by an extended dry period.

Certification in Western Australia began in 1935 in order to differentiate between the early Dwalganup cultivar and the then standard Mt. Barker or mid-season type. I can recall learning how to distinguish between the two when making the first inspections at Boyup Brook in the spring of 1934. Several of the paddocks were on the “Dwalganup” property of the late P. D. Forrest, where the new cultivar was first noted.

Over the years the subterranean clover seed industry has been stimulated by the development of further new cultivars including Geraldton, Daliak, Bacchus Marsh, Seaton Park and Woogenellup.

The certification scheme conducted by the Department of Agriculture has ensured that reliable seed of such cultivars is available and undoubtedly has been a boon to the industry.

Seed testing

Seed testing has also played an important part, as it provides a yardstick for physical quality—purity and germination. With certification, the first consideration is genetic quality—purity of the cultivar—but under the scheme operating in this State, seed must also reach the required standards of physical purity and germination.

Under the Seeds Act, all seed sold must conform to defined standards and, therefore, it is necessary to have an efficient testing laboratory.

One of my first jobs after joining the Department was to undertake the seed testing. The equipment consisted of one rather crude balance and a Copenhagen water bath for germination tests. The Department now has a very well equipped laboratory incorporating accurate balances, controlled temperature incubators, vacuum counting equipment, ultra-violet lamps and other refinements to ensure rapid, accurate results.

International seed organisations

With the extensive international trade in seeds, and buying and selling done on the basis of quality, it is important to have standard methods of assessment throughout the world. These are defined by two world-wide organisations—the International Seed Testing Association (ISTA) for physical characters and the OECD Seed Certification Scheme for genetic quality.

Australia has been a member of ISTA for some time, with representatives on most of the technical committees.

More recently, Australia has become a member of the OECD Certification Scheme and a submission presented by this country for a separate scheme for subterranean clover and related species was recently accepted.

We have made great progress in the fields of seed production and technology since producing 4,506 lb of “grass seed” in 1901. Progress has been facilitated by goodwill and close cooperation between producers, merchants and the Department of Agriculture.