WILD RADISH

(\textit{Raphanus raphanistrum} \textit{L.})

Wild Radish is one of the most cosmopolitan of weeds. Regarded as being native to Europe it is now naturalised in most temperate countries of the world and is troublesome in both crops and pastures. The 2,4-D, or hormone-like herbicides, have assisted greatly with its control.
WILD RADISH
(Raphanus raphanistrum L.)

Wild Radish is regarded as a native of Europe, but is now naturalised in most countries of the world having a temperate climate. In England it is one of the most troublesome weeds of arable land and has been responsible for large reductions in the yields of cereals. It has found its way to the Americas, is widespread in New Zealand and occurs in every State of Australia.

In Western Australia, Wild Radish followed rapidly on the heels of agricultural development and details of its early history are obscure. It is now widespread and thoroughly established over a large portion of the State, being particularly troublesome in the Victoria district, especially on the flats in the vicinity of Geraldton and Dongara.

Although normally a winter and spring growing annual, under favourable moisture conditions germination may occur in the summer. Under such circumstances mature seeds are often produced when the plants are quite small. The growth of the weed is favoured by substantial early rains but, at the same time, an abundant early germination facilitates control measures. Wild Radish occurs on a variety of soils but is of greatest consequence on the rich heavier types.

DESCRIPTION

The vernacular name is readily understandable as Wild Radish belongs to the same genus, Raphanus, as the garden radish and the root, although not developed to the same extent, has a similar flavour. It is often erroneously regarded as being a degenerate type of the garden plant.

Wild Radish is an erect or spreading annual (rarely biennial) usually two or three feet in height but, under favourable conditions reaching six feet. It is much branched with a few short transparent hairs on the main stem. The lower leaves are pinnately divided or lobed, the upper segments being large and soft while the lower are smaller. The upper leaves are usually smaller and entire.

The flowers, about three-quarters of an inch long, are white or pale yellow with purplish veins. The cylindrical pod varies from one to more than 2in. in length and has a terminal beak. It is restricted between the seeds giving the appearance of a short string of beads and breaks, when ripe, into one-seeded segments.

SIGNIFICANCE

Wild Radish and the related wild turnip are two of the most widespread and troublesome weeds of cereal crops in Western Australia. Wild Radish is re-
WILD RADISH
A—Foliage; B—Flowering stem; C—Flowers; D—Seed pod; E—Seed.

(From a pen drawing by C. A. Gardner, Government Botanist.)
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The effectiveness of the hormone-like sprays in the control of Wild Radish is illustrated by the dense growth of the weed on an unsprayed strip in a crop near Northam. The sprayed portions are practically free from infestation.

Cognised by farmers as having some forage value and for this reason, in many cases, control rather than eradication is desired. It is a vigorous competitor for both crops and pastures, however, and many crops have been left unharvested due to the smothering effects of this weed. Harvesting is also made more difficult by the presence of the fibrous stems, involving repeated choking of the comb.

When eaten by dairy cows, wild radish has caused a taint in milk, and the seeds, if ingested in considerable quantities, may cause poisoning. This is only likely to occur if a concentrate such as screenings containing a high proportion of Wild Radish seed is fed to stock.

CONTROL
The widespread incidence of Wild Radish can be attributed to its distribution as an impurity in hay, chaff and grain. Seed oats containing Wild Radish has been responsible for its initial introduction to many districts.

Wild Radish has several characteristics which accentuate its significance as a weed and add to the difficulties of control. It seeds freely and the seeds which, as already mentioned, are retained in segments of the fruit may remain in the soil in a viable condition for many years. Paddocks on which little, or no Wild Radish has been seen for ten years or more, often become infested with this weed following ploughing, which brings dormant seeds to the surface and stimulates germination.

Wild Radish is likely to be most troublesome in late seasons when there is often little opportunity to cope effectively with the weed by cultivation before sowing the crop. Although there is a flush of germination following the first substantial rain, seedlings continue to occur over a period, adding to the control difficulties. Fortunately, with the advent of the hormone-like herbicides, Wild Radish is not nearly the same problem, in fact it is now possible to sow dry in late seasons and still feel confident of effectively controlling the weed. It is eaten readily by stock, particularly when the plants are small, and grazing, especially with sheep, is a useful control measure.

During the past five years, several different chemicals belonging to the hormone-like group have been used extensively in Western Australia for the selective control of weeds in cereal crops. Although results from the application of all these chemicals to wild turnip have been uniformly good, in a number of cases, particularly with aerial application, the control of Wild Radish has not been satisfactory. In 1953 the Department under-
took some detailed experimental work to compare the chemicals being used and to ascertain the value of others for the control of Wild Radish. At that time most of the spraying was being undertaken with the amine and sodium salt of 2, 4-D and the sodium salt of M.C.P.A. These were included in the treatments along with two different types of 2, 4-D ester one of which was less volatile than the usual type and therefore has less risk of damaging nearby susceptible crops.

Cereals are known to be less tolerant to both these preparations, however, and results had to be gauged on the effects on the cereal as well as the weed. At the time of spraying the wheat was about 8in. high and stooling. There was a moderate to heavy infestation of Wild Radish at the rosette stage with leaves 6 to 8in. in length. All chemicals were applied at the rates of four and six ounces of acid equivalent in five gallons of water per acre.

The four ounces of acid equivalent per acre of M.C.P.A. and 2, 4-D amine affected a proportion of the Wild Radish plants but did not give a satisfactory degree of control. The six-ounce rate of both gave reasonable control although some plants recovered and set seed. There was no apparent difference between the two types of ester but the results with four ounces were conspicuously better than with six ounces of amine and M.C.P.A. The six-ounce rate of the esters gave complete control of the Wild Radish without affecting the yield of grain.

As a result of this experimental work, the Department favours the 2, 4-D ester for the treatment of Wild Radish in wheat. For general control purposes, providing conditions are favourable, four ounces of acid equivalent per acre is recommended. When complete control is desired or application is being made by aircraft, six ounces should be applied.

When a crop is undersown with a legume, the susceptibility of the species used must be taken into account. Although some information is available, we do not possess the full story, and tolerance trials with barrel medic and Dwalganup subterranean clover are being continued. It is known that generally legumes are less affected by M.C.P.A. than by the ester of 2, 4-D with the amine in an intermediate position.

Experiments and observations so far indicate that subterranean clover will withstand rates of at least eight ounces acid equivalent per acre of the various types including the esters but in a number of instances a delay in the flowering time has been noticed. Delayed flowering means late seeding and in short seasons this could mean that the soil may not remain moist long enough for seed formation to take place. Under such circum-

![Fig. 2.—A wheat crop containing Wild Radish at the growth stage most suitable for effective spraying.](image-url)
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stances, old pastures would normally be re-established the following season from hard seeds in the soil but such a reserve would not exist in the first year of sowing. With first-year stands of clover in crops the decision regarding spraying of weeds can be difficult. By using six ounces acid equivalent of M.C.P.A. per acre maximum control of Wild Radish cannot be expected but the risk of seriously affecting the clover is slight.

The best time for spraying is influenced by the growth stage of both crop and weeds. It is possible to affect cereal yields by treatment at susceptible stages. The recognised “safe period” for wheat is between stooling at 6 to 8in in height and the early “boot stage” when the head is enclosed in the sheath of the flag leaf. Risk of damage continues during pollination but resistance again increases at the late “milk” and “soft dough” stages. We have had little experience with spraying weeds in oats and barley but it is known that oats is a more sensitive crop than wheat, with barley intermediate. Depression of yield with oats has occurred even with spraying carried out at the time considered most appropriate for wheat.

Weeds should be sprayed when small as they are then most vulnerable to the chemical and are also destroyed before becoming an important competitor for the crop. Furthermore, the cereal then provides the weed with little protective coverage from the chemical. When the wheat crop is at the beginning of the “safe period,” that is 6 to 8in. high, usually most of the weeds such as Wild Radish and wild turnip have germinated but are still relatively small and susceptible. By the time the weeds have commenced flowering, they have competed for some time with the crop for moisture and nutrients and will soon present a harvesting hazard by topping the crop.

Late spraying has been carried out with a view to causing large plants of radish and turnip approaching maturity to recede below the level of the crop and thus facilitate harvesting. This procedure does not take full advantage of the treatment, however, and can only be regarded as an emergency measure which may not always pay dividends. Grain setting can be affected by the chemical and unless applied by aircraft, considerable mechanical damage to the crop can occur when spraying is done so late in the season.

Although a low-volume spray unit is a relatively simple machine, it is required to do an accurate job. The even application of six to eight gallons of solution per acre seemed somewhat fantastic a few years ago but is now accepted as commonplace. It means, however, that the equipment must be in first class condition. The volume applied depends on the type of nozzle, the pressure at which the pump is operating and the travelling speed of the unit. Output tables are supplied for the various nozzles and providing the pressure and speed are maintained, the rate of application is usually satisfactory. It is advisable, however, to check from time to time the volume actually applied to a given area as, for various reasons, calculated rates can go astray. There is really no margin for error when four ounces of active chemical are being supplied per acre.

Strips of Wild Radish and turnip in crops draw attention to the necessity of clearing nozzles as soon as they become blocked.