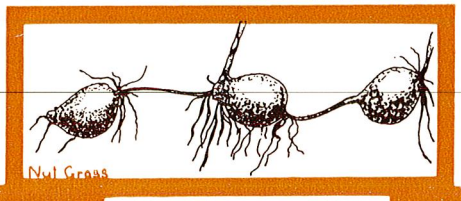
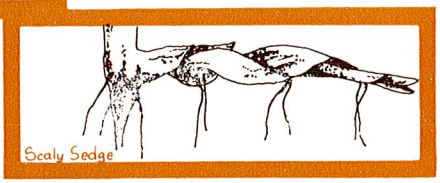
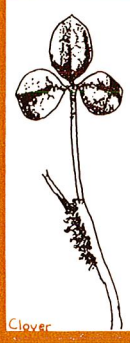
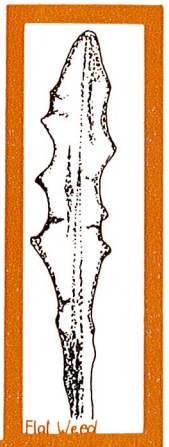
bulletin
3148

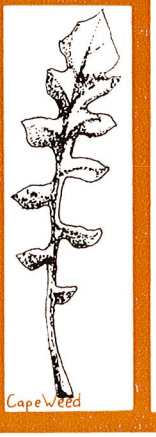


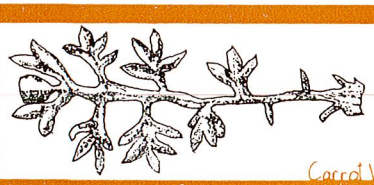




WEEDS IN LAWNS







Western Australian Department of Agriculture

BY G. A. PEARCE
AND R. D. ROYCE

WEEDS IN LAWNS

IDENTIFICATION OF WEEDS IN LAWNS

By R. D. ROYCE,
Officer-in-Charge, Botany Branch

Accurate identification of weeds is the first principle of weed control with modern chemicals. This is as true for weeds in lawns as any other weeds.

A spray which destroys one species may have no effect on another plant growing alongside, while a different spray may have exactly the opposite effect. The identity of the weed, therefore, is an important factor in deciding which spray to use.

Types of weeds

A number of weeds are common in lawns in this State and these belong to a number of different plant families. These weed species can be divided into two groups, the temporary weeds and the permanent weeds.

The temporary species are ones which develop in a newly established lawn, and are principally those which require space to develop. Veldt grass, geranium and plantain are examples of this type. As the young sward thickens up over the first two or three years these species gradually die out. They are usually of little consequence in the fully established lawn and only occasionally do they become troublesome.

On the other hand the permanent weeds are a constantly recurring trouble in maintaining a uniform surface on the lawn. In Western Australia there are numerous weeds of this type, and in this article 31 of the commonest and most troublesome of them are described.

To assist in their identification, a simple key based mainly on vegetative characters has been prepared. A description of each plant has been added, so that the identification from the key can be effectively checked.

Using the key

The key has been prepared on the dichotomous system, that is, there are always two opposing characters from which to choose.

For instance, the first step in using this key to identify a lawn weed is to decide between the two "A" characters; in other words, whether the leaves are "narrow, and either flat and grass-like, or oval in cross-section", or whether they are "flat and broad and sometimes divided into many lobes, but not grass-like". Each of the sections is divided into two smaller sections depending on two opposing characters in the same manner.

The use of the key will be made easier by a little practice, while a number of diagrams of the leaves and other structures referred to in the key will assist in interpreting the terms.

During the winter months most metropolitan lawns show a strong growth of a small pale-green weedy grass which can become troublesome, particularly in a couch lawn. The identification of this plant will illustrate the use of the key.

The plant has slender grass-like leaves, and by a comparison of the two "A" characters in the key it would clearly go under the first "A". There are then two "B" characters to choose between, and as the leaves are not rounded or oval in cross-section, but are flat and grass-like, it would be placed in the first "B".

The two "C" paragraphs in this section relate to the growth habit of the plant—it may either be present in the lawn all the year round, or it may be seasonal. The plant we are identifying is plainly seasonal since it germinates after the winter commences, and it would go under the first "C".

The final choice is then between plants which grow during the summer, and those which grow during the winter. Our plant is a winter grower, and this fact identifies it as WINTER GRASS. This identification is verified by the other characters "stemless and forming small clumps, leaves pale green and hairless". The number 1 refers to the fact that the first of the attached descriptions is one which gives further details of this plant.

KEY FOR THE IDENTIFICATION OF WEEDS IN LAWNS

A.—Leaves narrow, either flat and grass-like, or oval in cross-section. (Figs. A and B.)

B.—Leaves flat and grass-like. (Fig. A.)

C.—Plants short lived, dying at the end of the season, and regenerating the following year from seed.

D.—Plants growing during the winter months. Stemless and forming small clumps. Leaves pale green and hairless

(1) WINTER GRASS.

D.—Plants growing during the summer, developing many stems which root at the joints. Leaves dark green, hairy

(2) CRAB GRASS.

C.—Plants growing, and remaining green, during both summer and winter.

D.—Plants forming clumps and not spreading by elongated stems.

E.—Leaves narrow, usually rolled, grey-green. Seed-head elongated, narrow, resembling rat's tail. Growth mainly in winter

(3) PARRAMATTA GRASS.

E.—Leaves flat, broad, bright green. Growth mainly in summer. Seed-head green with several spreading branches

(4) PASPALUM.

D.—Plants spreading by means of elongated above-ground stems rooting at the joints, or by underground root-like stems sometimes deep in the ground and not at first sight apparent.

E.—Plants low, turf-forming and growing amongst the lawn grass.

F.—Leaves broad, resembling those of buffalo grass, but less harsh and of a paler green.

G.—Plant spreading by means of above-ground stems rooting at the joints. No underground stems. Leaves widely spaced on stem

(5) WATER COUCH.

G.—Plant spreading by both deep underground stems and above-ground stems rooting at the joints. Leaves crowded on the stems

(6) KIKUYU.

F.—Leaves narrow, bright green in colour; underground stems near the surface, and together with the bases of the upright stems covered with brown scales. Seed-heads small, globular, green

(7) KYLLINGA WEED.

E.—Plants with erect growing leaves which rapidly project above the level of the mown lawn. Seed-heads large, brown.

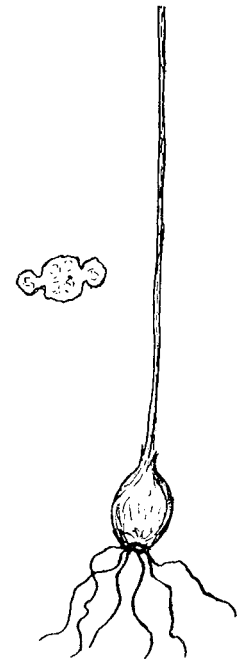


Fig. B

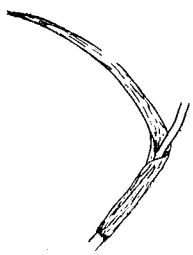


Fig. A

Fig. E

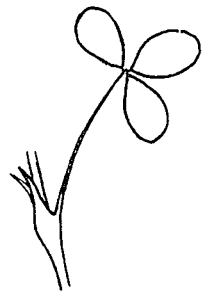


Fig. F

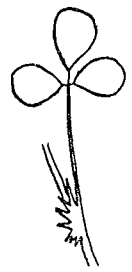


Fig G

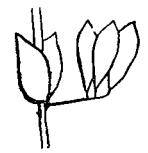


Fig. H

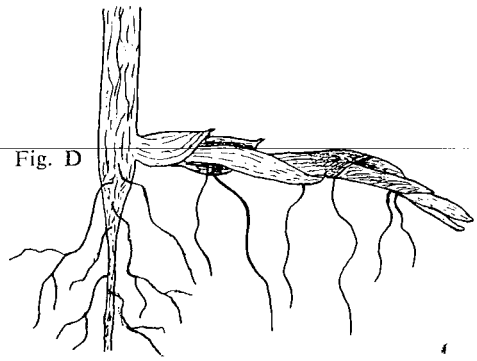


Fig. D

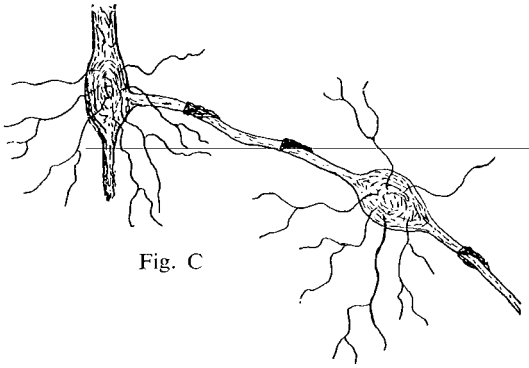


Fig. C

F.—Underground stems thin, wiry, black and swollen to form small "nuts" at intervals deep in soil. (Fig. C.)

(8) NUT GRASS.

F.—Underground stems thick, nearer the surface, and covered with scales. No "nuts". (Fig. D.)

(9) SCALY SEDGE.

B.—Leaves oval in cross-section, erect in growth habit and projecting above the level of the lawn. Winter growing species. Flowers red or mauve. (Fig B.)

(10) GUILDFORD GRASS.

A.—Leaves flat, broad, sometimes divided into many lobes, but not grass-like (Figs. E-N.)

B.—Blade of leaf either much divided into numerous segments, or composed of three leaflets borne at the apex of the leaf stalk. (Figs. E-K.)

C.—Leaf blade consisting of three leaflets at apex of leaf stalk. (Figs. E-H.)

D.—Plants present and remaining green during both summer and winter.

E.—Plants hairy, apex of leaflets deeply indented so that each leaflet is bilobed. (Fig E.)

(11) NATIVE WOOD SORREL.

E.—Plants completely without hairs; leaflets with an obtuse apex, and not indented. (Fig. F.)

(12) WHITE CLOVER

D.—Plants growing only in the winter months. Wing-like appendages (stipules) present at the base of the leaf stalk where it joins the stem. (Figs. F-H.)

E.—Stipules small, sometimes with a long tapering apex. Plants without hairs. (Figs. F-G.)

F.—Stipules with plain margins, not toothed. (Fig. F.)

(13) ANNUAL CLOVERS.

F.—Stipules with long narrow teeth along the margins. (Fig. G.)

(14) BURR MEDIC.

E.—Stipules large and leaf-like. Plants hairy. (Fig. H.)

(15) ANNUAL BIRDSFOOT TREFOIL.

C.—Leaf-blade divided into numerous lobes or segments, the divisions extending right to the axis of the leaf. The leaf stalk dilated at the base at its attachment to the stem. (Figs. I-K.)

D.—Lobes again divided or branched.

E.—Leaf-lobes straight, narrow and with a very acute apex. (Fig. I.)

(16) FUNNEL WEED.

Fig. I

Fig. J

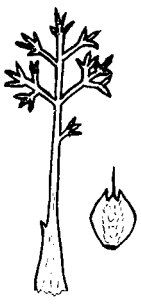


Fig. K

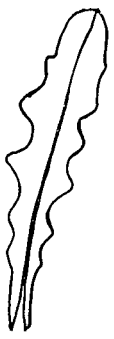


Fig. L

Fig. M

Fig. N

E.—Leaf-lobes broader, blunt at the apex or abruptly contracted into a short point. (Figs. J and K.)

F.—Leaf-stalk of fully mature leaf very short, the central axis of the leaf bearing lateral lobes almost to the base. Dilated base toothed on edges. (Fig. J.)

(17) CARROT WEED.

F.—Leaf-stalk of fully mature leaf longer than blade. Edges of dilated base of leaf-stalk smooth, not toothed. Fig. K.)

(18) ONEHUNGA WEED.

D.—Lobes broad, not divided, small near the base of the leaf, larger towards the apex. Terminal lobe largest

(19) CAPE WEED.

B.—Blade of leaf not deeply divided, but sometimes toothed or lobed. (Figs. L and N.)

C.—Stemless plant. Leaves lobed, in a rosette closely pressed to the sward; flowers yellow, produced on wiry, leafless, sometimes branched stem. Sap milky. (Fig. L.)

(20) FLAT WEED.

C.—Plants normally with leafy stems, without leaves in a rosette at ground level. Repeated mowing produces hard enlarged woody-stem butts which continually produce lateral stems.

D.—Leaves completely without hairs and without teeth or lobes. (Fig. M.)

(21) STARWORT.

D.—Leaves hairy, usually toothed. (Fig. N.)

(22) FLEABANE.

DESCRIPTIONS OF THE SPECIES

(1) WINTER GRASS (*Poa annua,* Linn.)

Small winter-growing annual, forming small tussocks up to 10 cm in diameter. Leaves flat, hairless, pale-green in colour with two translucent lines near the middle and running the length of the leaf and referred to as "tram-lines". Seed-heads develop in wid-winter and continue into spring. In well-watered lawns it may continue growth into the summer months.

Cosmopolitan, and widely distributed in W.A.

(2) CRAB GRASS (*Digitaria sanguinalis* (L.) Scop.)

Also known as SUMMER GRASS.

A vigorous summer growing annual, with a well developed root system, and long prostrate stems which frequently root at the joints. The stems usually grow amongst the lawn species and are difficult to effectively combat with the mower. Leaves hairy, short and broad, often with crinkled margins. Seed-heads purple, resembling a large couch grass head, and in late summer a badly affected lawn has a purplish colour due to these seed-heads.

Cosmopolitan, and widely naturalised in W.A.

(3) PARRAMATTA GRASS (*Sporobolus capensis,* Kunth.)

Plant present in the lawn all the year and remaining green. Strongly rooted vigorous tussocky plant, base stout but not woody. Under continual mowing the centre of the plant becomes turf-like, and the outside stems develop vigorously and almost horizontally. Leaves rolled, of a dark bluish-green colour, elongated. Flowering stems a grey-green or leaden colour, narrow and resembling a rat's tail, developing in the winter months. Very wiry in the lawn and difficult to keep cut.

Native to South Africa and naturalised in parts of the south-west.

(4) PASPALUM (*Paspalum dilatatum,* Poir.)

Green all the year. Base stout and woody, and under turf conditions producing lateral stems pressed into the turf. Leaves flat, 1 cm wide, often with a few hairs at the base, but otherwise hairless. Flowering stems develop in the summer months and grow rapidly so that mowing them sometimes proves difficult.

Native to South America; cultivated and widely naturalised in the south-west.

(5) WATER COUCH (*Paspalum distichum,* Linn.)

Present in the lawn all the year. Stems thick, rooting at the joints, prostrate among the lawn grass and forming part of the turf so that mowing has little effect on it. Leaves not crowded flat, elongated, up to 0.5 cm wide, pale green in colour and with a few scattered hairs. Plant develops vigorously during the winter months. Seed-head green, two branched, formed at the apex of the stem during early summer.

Native to tropical America, Africa and Asia; naturalised in swampy situations in the south-west.

(6) KIKUYU (*Pennisetum clandestinum,* Hochst. ex Chiov.)

Remaining green all the year, spreading by means of deep underground stems, white in colour, and by above-ground stems rooting at the joints. Leaves short, broad, more or less crowded on the stems, and short stems and leaves pale green in colour. Where not cut, the leaves may develop to a length of 15 to 20 cm. Hairless except at the base of the leaf blade. Makes growth at all seasons, but develops most vigorously in the summer months. Flowers are produced in late spring or early summer, and appear as fine filaments with anthers attached and as feathery stigmas protruding from the terminal leaves at the apex of the stems.

Native to Africa; cultivated and widely naturalised in the south-west.

(7) KYLLINGA WEED (*Kyllinga intermedia* R. Br.)

Small plant making growth throughout the year. Vigorous plant with underground stem covered with brown scales. Erect stems brown at base. Leaves fine, grass-like, more or less V-shaped in cross-

section and up to 10 cm tall, completely hairless and of a pale green colour. Plant is turf-forming and becomes an integral part of the lawn. When closely cut by a mower the brown scales at the base of the stems give the lawn a dead appearance. Flower-heads small spherical green balls at the apex of fine stems slightly longer than the leaves, and forming during the spring and summer months.

Native and occurring widely throughout the State.

(8) NUT GRASS (*Cyperus rotundus,* Linn.)

Present in the lawn all the year. Underground stems fine, black, with a few scattered scales but swollen at intervals to form "nuts". This stem gives rise to above-ground leafy stems which root vigorously. Leaves keeled into a V-shape or flat, crisp and not fibrous. Flowering stem three angled, producing two or more leafy bracts at the apex and a cluster of brown-coloured spikelets on long slender stalks. Grows vigorously during winter and flowers in spring and early summer.

Native to W.A., but a troublesome weed.

(9) SCALY SEDGE (*Cyperus tenuiflorus,* Rottb.)

Closely resembles true nut grass in the above-ground parts. Differs only in the character of the underground stem, which in this species is thick and covered by coarse leaves or scales. It is the presence of these scales which gives the plant its common name.

Native to W.A. and widely distributed.

(10) GUILDFORD GRASS (*Romulea rosea* (L). Eckl.)

Appears in April or May. A single leaf, erect, smooth and more or less rounded or compressed develops from a brown bulb-like corm 2 to 10 cm below the ground. Eventually as many as 10 leaves may appear. The flowers are produced on short stalks and in a lawn they are usually borne at the grass level. They are bell-shaped, up to an inch in diameter when fully expanded, and red in colour with a yellow throat. The fruit are small cylindrical seed-filled capsules, which are sweet and juicy when young, and referred to by school children as "puddings".

Romulea rosea var. *parviflora,* J. G. Baker, is a similar plant with finer leaves and a smaller mauve-coloured flower with a yellow throat. It is probably more common than the species itself, and is just as troublesome and difficult to control with a mower.

Native to South Africa; wideley naturalised in the South-West.

(11) NATIVE WOOD SORREL (*Oxalis corniculata,* Linn.)

Present in the lawn throughout the year. Stems fine, reddish coloured, hairy, growing close to the ground and among the turf species, rooting at the joints, much branched. Leaves consisting of three leaflets, each with an indented apex, sometimes deeply divided and coarsely two-lobed, hairy, dark green in colour. Flowers small, yellow, bell-shaped, 1 cm across when fully out, single or in clusters of two to five at the apex of a slender stalk which is longer than the leaves. Flowers in spring and early summer.

Native to W.A. and occurring throughout the State.

(12) WHITE CLOVER (*Trifolium repens,* Linn.)

Present in the lawn all through the year and growing amongst the turf species. Stem wiry, hairless, rooting at the joints. Leaves of three leaflets at the apex of the leaf stalk, each leaflet rich green in colour, often with a white transverse mark and flecks of brown, broadest in the middle, tapering towards the base and finely toothed around the edge. Flower stalks produced during the summer. Flowers white, 30 to 40 in a cluster at the apex of the flowering stalk, turning pink and bending downwards when withering.

Native to Europe and Asia; cultivated and naturalised in the South-West.

(13) ANNUAL CLOVERS.

Many species of clover occur as winter-growing weeds in lawns. They all have leaves consisting of three leaflets with a small green appendage (stipule) at the base of the leaf stalk, where it joins the stem. Flowers are produced in heads at the apex of flowering stalks or in clusters on the stems. The principal species which occur in lawns in this State are:—

(1) SUCKLING CLOVER (*Trifolium dubium,* Sibth.): Slender wiry stemmed plant with small heads of yellow flowers. Flowers in spring.
Native to Europe.

(2) HOP CLOVER (*Trifolium campestre,* Schreb.): Wiry stemmed plant with large barrel-shaped heads of yellow flowers, heads up to 1 cm long. Flowers in spring.
Native to Europe, Africa and western Asia.

(3) DROOPING FLOWERED CLOVER (*Trifolium cernuum,* Brot.): Leafy, wiry-stemmed plant with small heads of pinkish flowers which bend downwards and turn brown as they wither. Flowers in spring.
Native to southern France and Spain.

(4) CLUSTER CLOVER (*Trifolium glomeratum,* L.): Hard stemmed, sparsely leaved plant with dense heads of pinkish flowers along the stem and without flower stalks. Flowers in spring.
Native to western Europe and Mediterranean region.

(5) SUFFOCATED CLOVER (*Trifolium suffocatum,* L.): Almost stemless plant, leaves on long stalks. Flowers clustered on the short stems at the base of the plant. Flowers in spring.
Native to western Europe and Mediterranean region.

(6) SHAFTAL CLOVER (*Trifolium resupinatum,* L.): Leafy plant closely pressed to the soil and growing amongst the turf species. Flowers red, produced during early summer. Fruit bladdery with a fancied resemblance to a strawberry.
Native to Europe and Mediterranean region.

(14) BURR MEDIC (*Medicago denticulata,* Willd.)

Coarse vigorous plant without hairs and with a stipule which has long slender teeth along its edges. Flowers yellow in clusters on the flower stalk. Fruit a spiny, coiled burr.

Native to western Europe and Mediterranean region; widely naturalised in the South-West.

(15) ANNUAL BIRDSFOOT TREFOIL (*Lotus angustissimus,* Linn.)

Wiry stemmed plant with leaves of three leaflets, and with leaf-like stipules at the junction of the leaf stalk with the stem. Leaves and stems hairy, leaflets with a pointed apex. Flowers yellow on a long stalk, single or two together, produced in spring.

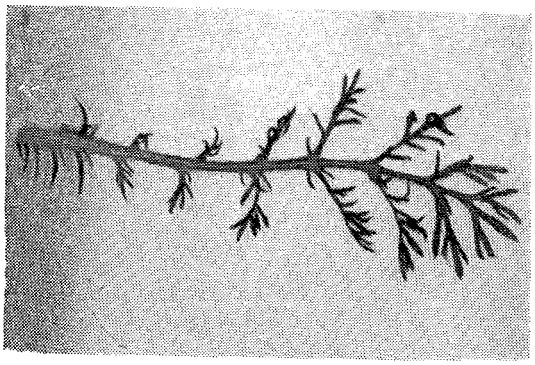
Lotus hispidus, Desf. closely resembles this species, but the leaflets are rounded at the apex and the flowers are borne in clusters of three or four.

Native to Europe and Mediterranean region; widely naturalised in the South-West.

(16) FUNNEL WEED (*Cotula turbinata,* Linn.)

Delicate winter-growing annual plant, 2 to 10 cm tall. Stem branched, leafy, the leaves much divided into narrow, straight lobes, each terminating in an acute point. Leaf stalk dilated at the base where it joins the stem. Flowering stalk elongated and swollen upwards under the flower head, giving the appearance of a funnel. Flowers in a typical daisy head, yellow in the centre with white rays around the circumference. Flowers in winter.

Native to South Africa; naturalised in several districts and common in the metropolitan area.



Funnel weed

(17) CARROT WEED (*Cotula australis* (Less.) Hook.)

Delicate winter-growing plant 2 to 8 cm tall. Stem much branched, frequently rooting at the lower joints, the mature stem leaves much divided into broad rounded lobes with a blunt apex and with a very short left stalk. Seedling leaves frequently with a short blade and a long leaf stalk, and difficult to distinguish from those of onehunga weed. The dilated base of the leaf stalk is toothed, and the flowering stalk is not swollen under the flower head. Flower head without evident white rays and is produced in winter and spring.

Native to Australia and New Zealand and widely naturalised in the South-West.

(18) ONEHUNGA WEED (*Soliva pterosperma* (Juss.) Less.)

Slender winter-growing plant resembling carrot weed. Stems rather thick and spreading along ground Leaves much divided into rather broad rounded lobes with a blunt apex. Blade of fully mature leaf short with a long leaf stalk, dilated at the base where it joins the stem. Flowers few in heads borne on the stem without a stalk. Fruit is flat and plate-like, with a rigid prickle point at the apex. This plant is objectionable as a weed in the home lawn because of this spiny fruit. Flowers are produced in early winter, and seeds are formed very early in the season.

Native to Chile; common in the metropolitan area.

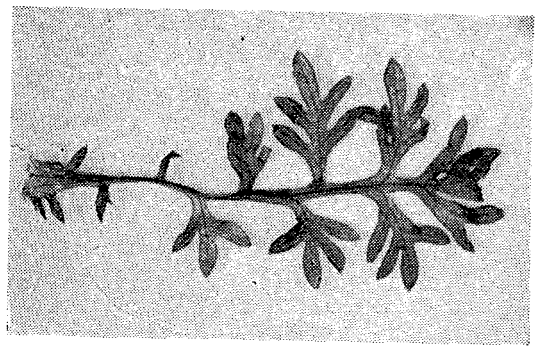
(19) CAPE WEED (*Cryptostemma calendula,* (L.) Druce.)

Stemless or shortly stemmed plant, growing along the ground. Leaves and stems fleshy and succulent. Leaves greyish-green and hairy above, white with hairs below, deeply lobed, the lobes rounded at the apex and extending down to the central axis of the leaf. The terminal lobe large, extending down both sides of the leaf axis and sometimes with shallow indentations or lobes. Lobes near base of leaf small. Flowers in typical daisy head, dark in centre with yellow rays. Flowers in spring.

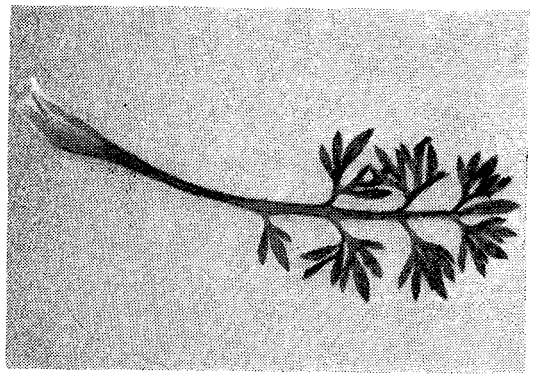
Native to South Africa widely distributed in the southern half of the State.

(20) FLAT WEED (*Hypochoeris glabra,* L.)

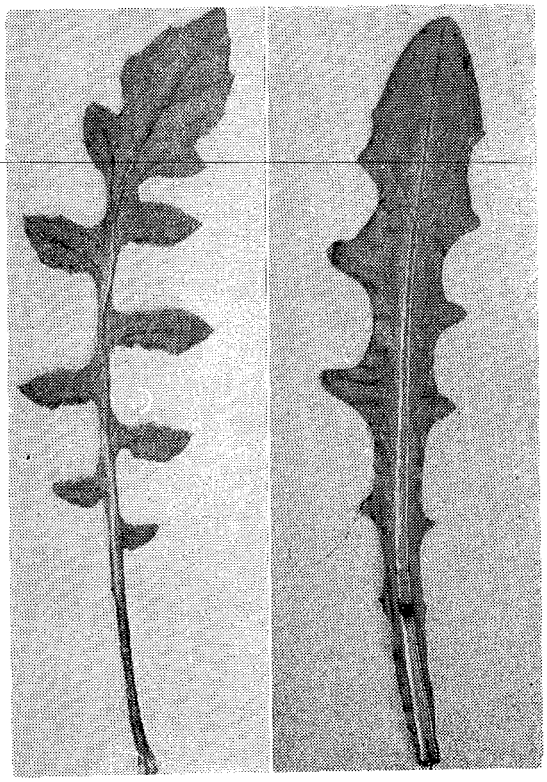
Stemless summer-growing plant with rosette of leaves at ground level, annual or persisting for a few years. Leaves 10 to 15 cm long, coarsely toothed or more or less deeply lobed with rounded lobes, hairless or with a few scattered rough hairs. Flowers yellow thistle-like on elongated usually unbranched flowering stalk 15 to 25 cm tall. Flowering midsummer. Sap milky.



Carrot weed



Onehunga weed



Cape weed Flat weed

Hypochoeris radicata, L. is a similar plant but with leaves very roughly hairy, each hair with a rigid swollen base, and the flowering stalk coarser and mostly branched. Usually difficult to distinguish from *H. glabra.*

Both native to Europe and Mediterranean region; widely naturalised in the South-West.

(21) STARWORT (*Aster subulatus,* Michx.)

Woody annual reaching 1 to 2 m in height in waste land. In lawns and under conditions of continual mowing, the base of the stem becomes hard, thick and woody, developing buds on all sides. The branches grow laterally, almost prostrate among the lawn grass, sometimes extending from 5 to 10 cm from the main stem. Leaves narrow, widest in the middle, tapering both ends, 3 to 10 cm long and up to 0.5 cm wide, occasionally with a few bristly hairs along the edges, otherwise completely hairless. Flowers daisy-like, with yellow centre and white rays 0.5 cm in diameter formed at the ends of branches and among the leaves of the lawn grass. Flowers mid to late summer.

Native to eastern North America; naturalised in the South-West.

(22) CANADIAN FLEABANE (*Erigeron canadensis,* L).

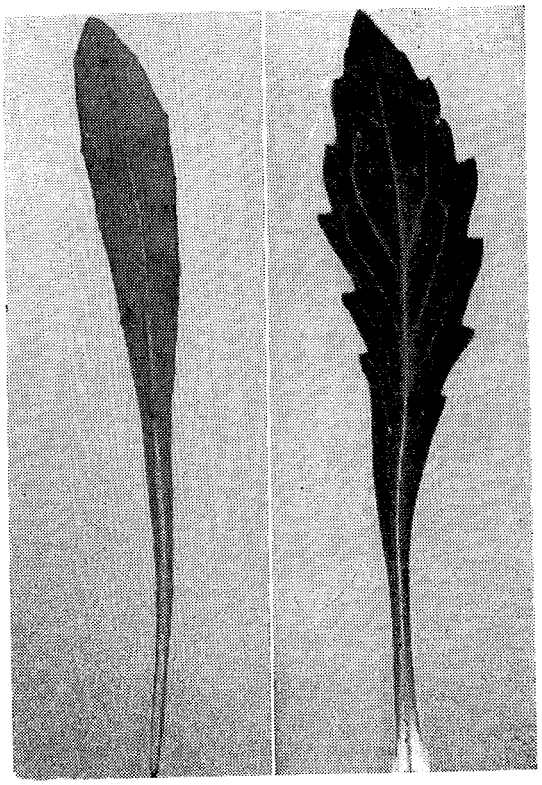
Woody annual, normally reaching 1 to 2 m in height. In lawns it has the same habit of growth as the starwort. Leaves and stems hairy with rigid hairs. Flower heads surrounded by numerous narrow, green, leaf-like bracts and the flowers do not expand as do those of starwort. Flowers in early summer.

Native to North America; naturalised in the South-West.

COMMON FLEABANE (*Erigeron bonariensis,* L.)

Closely resembles Canadian fleabane and is difficult to distinguish from it in the vegetative conditions and without flowers. This plant also occurs commonly in lawns and is in all ways similar to Canadian fleabane.

Native to Mediterranean region; naturalised in the South-West.



Starwort Fleabane

THE CONTROL OF WEEDS IN LAWNS

By G. A. PEARCE,
Senior Adviser, Biological Services Division

Most lawns have weeds growing in them at some time during the year and in some lawns weed control becomes a major problem.

To the many people who like to keep a weed-free turf it is therefore encouraging to know that nearly all weeds can be controlled with herbicides.

While herbicides can usually give good weed control, it should be remembered that an unthrifty lawn usually becomes a weedy lawn. The importance to weed control of practices which produce a vigorous turf cannot be overemphasised.

During the winter, conditions are less favourable for lawns and the rate of growth slows considerably. Because of the reduced competition, weeds are able to establish themselves more easily and it is noticeable that nearly all lawn weeds are winter growing.

The vigorous competition of weeds such as winter grass can stop the growth of the lawn grass completely. After the weeds have died, bare patches appear and provide ideal conditions for establishment of summer growing weeds.

The idea of using a chemical to kill weeds in lawns is not new. For many years chemicals such as sulphate of ammonia, copper sulphate arsenic pentoxide and sulphide of iron have been used, often to the disadvantage of the lawn. The herbicides now available are much more effective and are rarely recommended if the turf is likely to suffer.

Origin of weeds

In newly established lawns the main source of infestation is from seed present in the virgin topsoil. Plants whose seed is carried by the wind are particularly prevalent. Common examples include flatweed, thistles and annual grasses.

A good practice to overcome this problem when first establishing a lawn is to prepare the seed bed, water it well so as to encourage the germination of weed seeds, and then destroy the seedlings as soon as they are through the ground. This can be done by spraying with kerosene, although the use of a rake has the additional advantage of inducing a further germination. If this procedure is repeated several times before the lawn is planted, the soil should be relatively free of weed seeds. Lawns planted in the autumn are invariably faced with this problem.

With established lawns, weed seeds are continually being brought onto the turf in a variety of ways, including topdressing soil or animal manures, machinery (particularly mowers), animals and people. Moreover, wind-carried seeds are continually blowing from neighbouring infestations.

Effect of herbicides on lawn grasses

There are a number of grasses used for lawns and because of their different characteristics the problem of weeds is not always the same. Similarly their reaction to herbicides differs widely.

With all lawn grasses damage can be caused if higher rates of application are used than those recommended. For this reason it is better to give a second application of herbicide 21 days after the initial spraying, if necessary, than to attempt to obtain complete control with a single treatment.

Buffalo

Buffalo is the most common grass used for household lawns. The wide coarse leaves form a dense turf in which weeds do not easily establish themselves. It is probably the only lawn grass which, when kept in good condition, will check the growth of vigorous weeds like crabgrass.

All the herbicides mentioned can be used on buffalo, but in the case of DSMA some slight scorching may be experienced. However, this is usually not noticeable 10 to 14 days after spraying.

Couch (Bermuda)

Most playing fields and a large number of household lawns are grassed with couch. This withstands hard wear and, because of its vigorous summer growth, under proper man-

agement, provides keen competition for weeds. However, its lack of growth during the winter allows weeds to readily establish themselves. Its ability to persist under adverse conditions often means it is neglected, and this allows weeds to invade the turf.

Herbicides can be used with greater safety on couch than any other lawn grass. When growing under highly artificial conditions, however, such as in a bowling green, great care must be exercised to avoid causing damage. Under this situation the rooting system is often very shallow and therefore vulnerable, while the rapid growth of the foliage renders the leaf liable to contact damage.

Couch (Queensland Blue)

This more recently available turf grass spreads from stolons on the surface of the soil rather than shooting from the root system. The root system is shallower and, generally speaking, is not as resistant to herbicides. This only means that the usual care should be taken when spraying weeds present.

Bent, Fescue and Kentucky Blue

These grasses are often planted in association with couch because they make active growth during the winter. Their root system is very shallow and they are readily damaged by herbicides. Unless a weed infestation is very serious, chemicals should not be used on them. Where it is felt necessary to treat the weeds, several applications of a weak mixture of the herbicide should be used rather than one at the normal rate of application.

Kikuyu

In heavy soils, or where water is not available during the summer, Kikuyu is often planted. Under these conditions its spread can be restricted, and weeds are not often a problem. Selective herbicides can readily be used where required.

Eradication of lawns

Occasionally it is desired to kill a lawn and replant with a different grass. A common method of doing this is simply to cease watering. Eventually when this is not completely successful, consideration is given to using a herbicide.

A better approach is to use the herbicide immediately. It should be remembered that an actively growing, well watered lawn is more susceptible to herbicides than an uncared-for turf. For this reason watering should be continued even after the herbicide has been applied. This also induces any dormant runners to shoot after most of the grass has been killed. Any new growth should be treated as it appears. Once the grass appears completely dead the remains of the turf should be removed. This can be done by rotary hoeing which will mix the organic matter into the soil, and also induce growth of any dormant runners and seed.

A suitable herbicide for this purpose is 2,2-DPA applied at the rate of 500 g of 85 per cent. material in 14 l of water per 30 square metres. The addition of a wetting agent helps the chemical stick to the leaf.

RESISTANT WEEDS

There are still some weeds found in lawns which cannot be controlled selectively with herbicides.

Guildford grass reproduces from seed and also from corms formed at the base of the growing plant. Picking the flowers, and thus peventing the formation of seed, will not control this weed.

Mowing regularly at weekly intervals and preventing the formation of both seeds and corms will control Guildford grass. However the leaf must be cut at ground level each time rather than rolled over. A rotary-type mower is ideal for this purpose.

Guildford grass can also be controlled by spraying with an oil such as kerosene. This treatment discolours the lawn completely, and to be effective should be applied six weeks after the general emergence of the weed in the autumn. A second application is often required five or six weeks after the initial spraying to control any later germination. Following the treatment the turf usually remains dormant during the winter but makes a complete recovering during the spring. *This oil treatment for Guildford grass is very severe and is only recommended for extreme cases.*

Nut grass cannot be controlled selectively with herbicides. The true nut grass has nut-like structures along the root system and these can remain dormant for a number of years. Unless the root joining the "nuts" is broken, each one will not germinate until the one closer to the parent plant has sprouted.

Hand pulling can be quite effective for small infestations provided this is done regularly and persisted with until the supply of dormant "nuts" is exhausted.

An even coverage of spray material is essential. The dark strips are patches of winter grass missed at the time of spraying.

Some degree of control can be obtained with regular applications of 2,4-D, but the repeated spraying required usually proves detrimental to the lawn.

The other species of Cyprus scaly sedge, which does not have the "nuts" is more readily handled. This should be cut out with a sharp implement just below ground level, and provided the crown is removed the plant will not grow again. This method is too tedious for large areas, and only the regular application of 2,4-D can be suggested for its control.

CHEMICALS

The use of chemicals for the control of weeds in lawns is not new. Sulphate of ammonia, copper sulphate, arsenic compounds and many more dubious substances have been used for many years with varying degrees of success, often at the expense of the lawn.

The modern herbicide is more effective against weeds, and is seldom recommended if damage to the turf is likely. Despite this, care is needed to ensure that the spray is correctly mixed and that it is used at the proper rate of application.

Damage to gardens

All the chemicals recommended will cause damage to garden plants, particularly annuals, if sprayed directly onto the foliage. For this reason care must always be taken to prevent the spray drifting onto garden areas.

Any spray equipment used should be thoroughly washed, immediately after use, with a warm soapy solution.

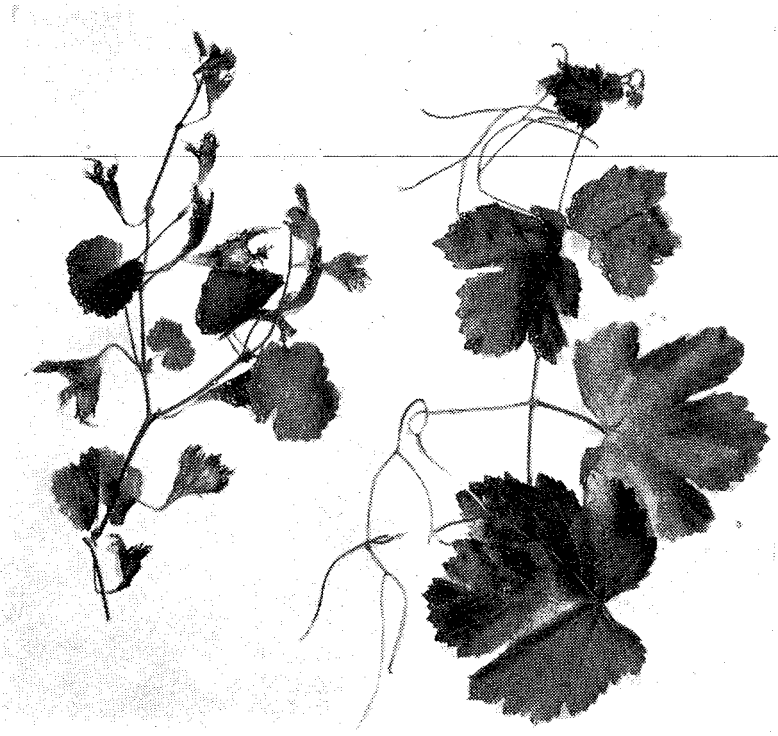
Hormone damage

When using the hormone-like herbicides 2,4-D or 2,4,5-T, extra care should be taken to avoid spray drift damage. It is desirable to keep a special spray for applying this type of herbicide. When this is not practical it is essential to replace the rubber or plastic parts of a spray before using the equipment for other garden spraying.

1. **Bromoxynil**
   Capeweed
   Jo Jo (or Onehunga)

This chemical is a quick acting contact herbicide which is particularly effective for controlling Jo Jo. Although this weed is readily killed by 2,4-D, most people do not become aware of its presence until the spiny seed case has begun to form in the spring. By then it is important to kill the weed quickly before seed is formed, so that bromoxynil is then the best chemical to use.

Fifty ml of 20 per cent bromoxynil in 14 litres of water is sufficient to treat 100 square metres. The optimum time to spray is during the winter but a good kill can still be obtained right up to the end of the growing season.



Typical damage on a grapevine caused by 2,4-D or 2,4,5-T. Note the narrowing, feathering and curling of the leaves. Great care should be taken when using these sprays near garden plants.

Bromoxynil is not a hormone-type spray and, providing there is not too much wind, is quite safe to use amongst garden plants. It is not harmful to any lawn grass at the recommended rate of application.

2. **Nabam—**

Moss
Algae

The presence of moss and algae in a lawn often indicate a soil condition which should be rectified at the same time as the chemical control treatment is applied. These weeds are most likely to become a problem in areas which are shaded and poorly drained. To overcome this condition the soil surface should be vigorously raked to break the organic seal and allow aeration. The moss or algae present should then be sprayed with a solution made by mixing 90 ml of Nabam in 14 litres of water and applying this quantity to 85 square metres. The treated area should be well watered after spraying so that the chemical will be moved into the root zone. Follow-up treatments should be applied at monthly intervals as required to cope with any further emergence.

3. **Dicamba + MCPA—**

Caustic weed
Clovers
Trefoils
Flatweed
Sorrel

The different types of clovers are readily killed with dicamba, while the addition of MCPA to the mixture will give control of a number of broad-leaved weeds.

The same precautions mentioned in relation to hormone-like herbicides must be exercised when using this chemical. Perennial clovers may require a second treatment.

4. **2,2-DPA—**

Kikuyu
Couch
Parramatta

2,2-DPA + Amitrole—

Paspalum

Amitrole TL—

Water couch

These herbicides are harmful to grasses and cannot be used selectively on a lawn. Where only small infestations are present the leaves can be carefully painted with a solution con-

taining the appropriate herbicide. An old paint brush is ideal for this purpose.

The herbicide, 2,2-DPA, is available under a variety of trade names, while 2,2-DPA + amitrole is sold only under the name of Weedazol Total. Amitrole TL has the trade name of Weedazol TL. The first two of these herbicides are powders and 500 g should be dissolved in 14 litres of water. For water couch, Weedazol TL is used at the rate of 700 ml per 14 litres of water.

The alternative to these treatments is to remove the affected area of lawn completely and returf.

5. **DSMA—**

Crabgrass

MSMA—

Crabgrass
Kyllinga

Both these herbicides are effective for the control of crabgrass in lawns. They only affect the plants present at the time of spraying, and seedlings which appear later will not be affected by the treatment. For this reason, more than one spraying is usually required during the summer period.

Because the different brands do not have the same active ingredient, the rate shown in Table 2 should be followed. The addition of a small quantity of wetting agent helps the chemical stick to the leaf.

Young plants are more readily killed than well established plants, so that control measures should be undertaken as soon as a general emergence has taken place. The area treated should be inspected three weeks after the initial application and, if the plants have not been killed, or have commenced to make new growth, a second treatment should be applied.

For well established plants, a second application is often needed.

A number of advantages are obtained if the chemical is applied through a high volume boom spray unit. However, careful hand spraying can give the same results.

Because the chemical acts against the leaf of the plant, it is not advisable to spray immediately after mowing. It is also best to water the lawn the day before the herbicide is applied, so that the treatment will have the maximum time possible to take effect before the next watering.

Spraying during the heat of the day increases the effect on the weed but the lawn is also likely to be scorched; however, this will be back to normal in 10 to 14 days.

Kyllinga weed, a perennial sedge which makes active growth throughout the year, is very difficult to kill. Some success has been obtained by using MSMA during the summer period. Any plants which survive the treatment should be resprayed 4 weeks later.

MSMA and DSMA can be used on couch and buffalo lawns, but are very severe on bent, fescue, Kentucky blue grasses. Queensland blue lawns should not be sprayed as this grass will be completely killed.

6. **Endothal—**

Winter grass

This herbicide is often used for the control of winter grass and has the advantage that it can be used on the soft leaved grasses such as bent. It should be applied during the first five weeks of growth and a second application may be required 14 days later. If applied during hot, dry weather (temp. above 25°C), the turf may be scorched but this soon recovers. Any reseeding can be undertaken 2 to 3 weeks after the last spraying.

7. **Kerb—**

Winter grass

Kerb is the most effective herbicide yet tested for the control of winter grass. The chemical should be applied in April or early May and is effective against emerged plants or germinating seeds. The rate of application should be 85 g in 4 litres of water per 100 square metres. If the plants have begun to flower (8 weeks after germination), the rate should be increased to 120 g.

This treatment will prevent the establishment of winter grass for the rest of the year. It is safe to apply to couch, buffalo and Queensland Blue couch, but should not be applied to Kentucky Blue grass.

For large areas, the rate of application should be 1.2 kg/ha.

8. **2,4-D—**

Capeweed
Flatweed
Funnel weed
Jo Jo (Onehunga)
Starwort
Fleabane

There are two common types of 2,4-D used for weed spraying. These are the amine and ester derivatives, and although the latter type is the more effective, some caution must be exercised when using it, because of its volatility.

Where weeds growing near garden areas are to be sprayed, the amine should be used, while for areas such as playing fields, the ester type is preferred.

9. **Bensulide———**

Winter grass
Crabgrass

This herbicide only kills seeds as they germinate and is effective against winter grass and crabgrass. The treatment should be applied in mid-March for winter grass control and mid-November for crabgrass. Unfortunately, the cost of the treatment is high compared with alternative chemicals. However, it is safe on the usual turf grasses and has been used extensively on bowling greens and golf greens without causing damage.

10. **2,4,5-TP**

Wood sorrel
Four o'clock
Soursob

These weeds are difficult to control when growing in lawns. However, this herbicide will eliminate practically all the weed growth and can be applied to couch, buffalo, Queensland blue and Paspalum vaginatum lawns. A second application may be required.

11. **Siduron—**

Perennial grasses and crabgrass can be killed when growing in established plantings of bent grass by treatment with siduron. It cannot be used on other types of lawn grasses. 570 ml in 14 litres of water is sufficient to treat 85 square metres. A second treatment should be applied six weeks later. The weed will then begin to die.

In brief

- Know the name of the weed. This can be obtained from section, "Identification of Weeds in Lawns", or by forwarding a specimen to the Department of Agriculture.
- Check Table 1 for the recommended chemical.
- Read the section of the text describing the use of the recommended herbicide. Precautions and rates of application are given.
- Check Table 2 for the trade name of the herbicide required and where it can be obtained.

Table I.—Common weeds found in lawns and the recommended herbicide for their control. The text should be consulted concerning precautions in applying the treatment. In Column 3 the herbicides are listed in order of preference.

Weed	Botanical Name	Herbicide	Time to Spray
Algae		Nabam	Optional.
Annual birdsfoot trefoil	*Lotus* spp.	Dicamba + MCPA	Autumn or winter.
Annual clovers	(*Trifolium* spp.) (*Medicago* spp.)	Dicamba + MCPA	Autumn or winter.
Burr trefoil	*Medicago denticulata*	Dicamba + MCPA	Autumn or winter
Capeweed	*Cryptostemma calendula*	Bromoxynil	Autumn or winter
Carrot weed	*Cotula australis*	2,4-D	Winter
Caustic weed	*Euphorbia drummondii*	Dicamba + MCPA	Summer.
Couch	*Cynodon dactylon*	Siduron	Optional
Crabgrass	*Digitaria sanguinalis*	DSMA	Early summer.
Flatweed	*Hypochoeris* spp.	2,4-D	Optional.
Fleabane	*Erigeron* spp.	2,4-D	Summer.
Funnel weed	*Cotula turbinata*	2,4-D	Winter.
Guildford grass	*Romulea rosea*	Resistant	
Jo Jo (Onehunga)	*Soliva pterosperma*	bromoxnyil or 2,4-D	Winter.
Kikuyu grass	*Pennisetum clandestinum*	Siduron	Optional
Kyllinga weed	*Kyllinga intermedia*	MSMA	Summer.
Moss		Nabam	Optional
Native wood sorrel	*Oxalis corniculata*	2,4,5-TP	Winter.
Nut grass	*Cyperas rotundas*	Resistant	
Parramatta grass	*Sporobolus capensis*	2,2-DPA*	Optional.
Paspalum grass	*Paspalum dilatatum*	2,2-DPA* + Amitrol	Optional.
Scaly sedge	*Cyperus tenuiflorus*	2,4-D	
Soursob	*Oxalis pes-caprae*	2,4,5-TP	Winter.
Sorrel	*Rumex lacetocella*	Dicamba + Banex	Winter.
Starwort	*Aster subulatus*	2,4-D	Summer.
Water couch	*Paspalum distichum*	Amitrol TL	Optional
White clover	*Trifolium repens*	Dicamba + MCPA	Optional
Winter grass	*Poa annua*	Kerb, Presan, Endothal	Autumn.
Wood sorrel	*Oxalis corniculata*	2,4,5-TP	Winter.

* Will damage turf.

Table 2.—The herbicides listed are available in small packs from most florists and hardware stores. The same chemical is often available under several trade names (column 2). Column 4 shows the required amount of chemical to treat 85 square metres (100 square yards).

Herbicide	Trade name	Distributor	Quantity to 14 litres (3 gals.)
Amitrol TL	Weedazol TL Plus	Ciba-Geigy	700 ml
Bensulide	Exporsan	Lane Ltd.	250 ml
	Presan	Blue Cross	250 ml
Bromoxynil	Weedoben	Ciba-Geigy	45 ml
Dicamba + MCPA	Banweed	Blue Cross	85 ml
	Valiant	Lane Ltd.	100 ml
Endothal	Endothal	Blue Cross	30 ml
2, 2-DPA	Dowpon	Lane Ltd.	500 g
	Graypon	David Gray	500 g
	Pon	Blue Cross	500 g
	Terrapon	Terra Trading	500 g
2, 4-D Amine	2, 4-D Amine	Blue Cross	40 ml
	Nocweed A10	Lane Ltd.	160 ml
	Terramine	Terra Trading	40 ml.
2, 4-D Ester	Clover Killer	David Gray	40 ml
	Terraest	Terra Trading	20 ml
	Weedone LV57	Ciba-Geigy	40 ml
2, 4, 5-TP	Kuron	Lane Ltd.	12 ml
DSMA	Crabgrass Killer 60	David Gray	125 g
	DSMA 100	Blue Cross	85 g
	Pasma	Ciba-Geigy	125 g
	Passtox	Lane Ltd.	85 g
	Terra DSMA	Terra Trading	85 g
Kerb	Poakil	Lane Ltd.	15 g
MSMA	Daconate	R. W. Wylde	50 ml
Nabam	A103	Lane Ltd.	90 ml
Siduron	Tupersan	Blue Cross	570 g

NOTE.—28.35 g = 1 ounce. 28.41 ml = 1 fluid ounce.

29670/7/74—5M

WILLIAM C. BROWN, Government Printer, Western Australia