W E E D S.

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In the daily confrontation between people and weeds, the farmers are mainly concerned with eradicating the latter, not with studying them. The purpose of this article is to look a little more closely at these interesting plants, these forgotten children of the Plant Kingdom. It, however, will only be a first look, opening new avenues of investigation, touching only on a few aspects of this fascinating subject.

The first hurdle to overcome is to establish a definite meaning for the word, 'weed'. I prefer the definition which describes a weed as **"a plant in a place in which it is not wanted".** Although this may not be a perfect definition yet it covers most instances and enables some plants to be classified as weeds in places in which they are not wanted but also to be taken as useful plants in places where they are.

Early in a study of weeds a number of questions arise. Do these plants belong to a special plant family or group of families ? Are they greatly different from the plants we cultivate ? Why are they so prolific ? What are the reasons for what can only be described as their population explosion ? Why do they take possession before most other plants of an area of land that has been laid bare ? Why in some cases do they take over from cultivated plants, especially when these are left to fend for themselves ? Why are they so hard to eradicate ? To sum up : Why are they so successful as plants, especially as, in addition to their natural enemies such as grazing animals, diseases and plant pests, the hand of man is arrayed against them ? This article will attempt to answer, at least in part, most of these questions.

Now taking a bird's eye view of weeds we find that they are either herbs or shrubs, and either annuals, biennials or perennials. They constitute, on the whole, a miniature plant world. Their flowers are generally small and inconspicuous, and their fruits are usually insignificant also. Their foliage seldom has any decorative value. Identification presents a challenge to the interested amateur because the miniaturization of their flower parts makes it necessary to use a microscope and a fine, delicate touch is required for their dissection.

Identification has however been accomplished and the books authored by R. W. Kasasian and others, namely **"Common Weeds of the West Indies"** and **"Weeds of Trinidad"** are of great help. Using these books and other means of identification it

soon becomes obvious that a large proportion of the common weeds are either grasses (Gramineae), sedges (Cyperaceae) or members of the Sunflower Family (Compositae). Also noticeable are members of the Poinsettia Family (Euphorbiaceae). The pea family (Leguminoseae) is of course well represented, and members of the Hybiscus Family (Malvaceae), potato family (Solanaceae) and coffee family (Rubiaceae) can also be found. This of course does not by any means exhaust the roster of plants but it can be seen that as far as relationships are concerned there is nothing extraordinary or foreign about weeds. They are not by any means a separate group set apart from the useful and cultivated plants.

The answer to the question why weeds have such great reproductive facility lies in part in the fact that weeds are tremendous producers of seed. This is immediately evident when their life cycles are observed. Many weeds mature with amazing rapidity — after a few weeks — and from then on, often during their entire life cycle, continue to produce seed. A good example is provided by the so-called Shine Bush **(Peperomia pellucida)**. When only a couple of inches high and four to six weeks old, this plant has already put out its first inflorescence and its minute, dust-like seeds are soon after ready for dispersal. Weeds like Christmas Bush **(Eupatorium** spp.) seem almost like an exception. As its name indicates it flowers around Christmas time, but when it does flower it does so profusely and the efficiency of the Sunflower method of reproduction comes into play to perpetuate the plant in its immediate area. Experiments have been carried out at places such as Rothamstead to determine the number of viable weed seeds per acre in various locations. It was found that in rather poor, acid grassland figures as high as 100 million per acre have been observed. In arable lands, where the greater production of seed is offset by such factors as the higher mortality of seeds due to rotting, figures of from 2 to 50 million per acre have been obtained. Under certain exceptional conditions in permanent wheat plots a figure of over 150 million was recorded.

The profuse production of seed is only one factor in ensuring the great reproductive potential of weeds. In the course of their evolution weeds have developed very efficient methods of seed dispersal. These are of course similar to the methods developed in the more well known plants and it is therefore not necessary in this article to go into these in any great detail as these methods are already well known. A few examples, therefore, are all that is required. Dispersal by animals, including man, is fairly common. In this method hooked hairs or spines cause the seed to adhere to wool or hair or other surfaces. Possibly the best known example of this is the weed called

Cousins or Sweethearts (**Desmodium** spp.) which is so common in pastures. But there are also the common Clammy Bur or Fasten-pon-Coat **(Priva lappulacea)** and Hog Weed or Sow Meat **(Boerhavia diffusa).** At least one grass has adopted this method, namely, Bur Grass **(Cenchrus echinatus),** with its spiny covering, making it look like a sea egg. There are also many examples of dispersal by wind. The seeds of most of the representatives of the Sunflower family have the characteristic pappus of hairs which enables them to float in the wind and be transported considerable distances. **Asclepias curassavica** is another example of this method. Another method, probably more common among weeds than among other plants, is a simple dependence on lightness to enable a seed to be blown about by the wind. So many weed seeds are extremely small and light that they lend themselves readily to this method of dispersal. Whenever the ratio of surface area to weight is large flotation becomes easy, and this is accomplished in many instances by the seed or fruit being pitted or toothed or having attached to it appendages some of which may even be leafy structures derived from the flower. As mentioned above, Shine Bush has very light seeds and the weed, Purslane, sometimes even called Parsley, **(Portulaca oleracea),** has small black seeds. The grasses depend very largely on this method so much so that the examples are too numerous to mention in this article.

Some weeds only reproduce by seed. Among these are many members of the Sunflower family and others like **Sida** spp., the Broomweeds, **Solanum** spp. or Wild Tomatoes, and **Crotalaris** spp. or Rattle Weed. Many others are able to reproduce vegetatively, and examples of this are to be found even in the Sunflower family. For instance the Carpet Daisy, **Wedelia trilobata,** has semi-erect stems which root at the nodes of the portion lying on the ground. The next step is a completely prostrate stem growing either above ground or below ground. Many grasses and sedges, such as Savannah Grass **(Axonopus compressus)** and **Kyllinga brevifolius, K. sesquiflorus** or **K. tenuifolius** supply examples of these, as also West Indian Chickweed **(Drymaria cordata)** and Wild Hops **(Blechnum pyramidatum), Drymaria** is very successful and even survives weeding because its fragile stem breaks easily, leaving behind rooted sections each of which is capable of reproducing the plant. Corms, bulbs and tubers are also found, one of the best examples of these, and one of the hardest to eradicate, being Nut Grass **(Cyperus rotundus).**

By virtue of their very efficient reproduction systems weeds have a tremendous survival value or, shall we say, exert a forceful reproduction pressure. Given no competition a weed could

by seed reproduce itself thousands if not millions of times or by vegetative means produce a quantity of plant material greater in bulk than that of the largest Redwood (**Sequoia** spp.). A plot of land laid bare of vegetation, having its soil sterilized by artificial means against all living plant material, would soon be sowed with weed seeds brought in like dust through the air or would be invaded by runners, rhizomes or by other vegetative means from neighbouring weeds. This is why land laid bare by natural means such as landslides is soon carpeted by a growth of weeds.

The environment of the weed is largely hostile. Grazing animals eat them down, especially in the case of grasses. Because they are shallow rooted they are quickly affected by changes in the moisture content of the top soil and so die off rapidly in times of drought. They are, in addition, subject to destruction by more or less the same animal pests that attack the cultivated plants. Also they are not immune to virus and fungus diseases. But perhaps their worst enemy is man, because he does not want them and his attacks are lethal. Man weeds them up by hand or hoe and cuts them down by grass knife, scythe or lawn mower. Of late chemical poisons are used more and more. Yet weeds take all this punishment, but come surging back to live again, invincible, indestructible. One wonders whether the myth of Hercules was not inspired by the natural history of weeds. When Hercules attempted to destroy the nine-headed Hydra, as one of his labours, he found that for every head he cut off two reappeared. In man's labour to eradicate weeds for every one he destroys five or more seem to spring up.

Apart from their reproductive capacity weeds have certain other qualities that assist them in their struggle to survive. The structure of many weeds is such that they expose their most expendable parts to destruction while their vital parts remain unharmed. Grasses and sedges are outstanding examples of this. They thrust their leaves upwards to be eaten by grazing animals or to be cut off by mowing equipment while the stems and roots remain low down or underground ready to send out fresh shoots into the air. Many others have produced their seed so early that they have made provision for reproduction long before they are destroyed. Apparently also weed seeds, on the whole, are less liable to rot in the ground than those of other plants. Many of their seeds therefore remain dormant in the soil for long periods germinating only when conditions are favourable. Thus a weed that has invaded a plot of land will reappear seasons or even years after it is first destroyed so long as it has been allowed to produce seed on its first appearance. The stubborn weed defies destruction, so much so that if the agricultural departments

of the World united in a joint effort to eradicate weeds entirely the net result would probably be that they would all end in bankruptcy.

Just as weeds are destroyed by their hostile environment so they seem often to have the power to invade and smother stands of ornamental or cultivated plants. Many a person who has been away from his home for some time has experienced the distress of finding his garden overrun by weeds on his return. The question immediately arises, by what means does a weed do this ?

It has been established that there is a definite competition below ground between the roots of cultivated plants and weeds. In an article on "Root Development of Weeds and Crops in Competition under Dry Farming" by Pavlychenko and Harrington (Sci. Agr. 16, 151, 1935 (Canada) it was shown that mature wheat plants unimpeded by weeds had an average of 6000 in. of root per plant, but in competition with certain weeds this figure fell to anything from 4000 in. to 2000 in. On the other hand one of the weeds, charlock, had an average of 2,700 in. of root per plant, and another, wild oat, had 9000 in. Passing into the realm of supposition it may be that weeds have such excellent root systems that they grow faster than and so can smother other plants. An examination of the root systems of some weeds does seem to bear this out. Pull up a grass or a sedge and examine the roots. The union between root and soil is so close that a large quantity of soil comes up with the roots. Shake the roots to remove the soil. There will be revealed a tuft of roots so close and thick that they would seem to penetrate every part of the soil in which they grew, forming an intimate mixture. Pull up a Consumption Weed **(Cleome ciliata)**, a Cousins **(Desmodium)** or a White Broom **(Borreria verticillata)** and observe the very long tap root, in some cases as long as the parts of the plant above ground. Is the purpose of this to supply the plant with copious food material so that it will grow quickly or is it to find water in the lower levels of the soil ? Certainly under dry conditions **Borreria** seems to survive better than most other weeds. These are questions worthy of further research.

There is also fierce competition between weeds and weeds. The harmless looking West Indian Chickweed **(Drymaria)** with its extensively creeping and rooting stem can sometimes take over an extensive area to the almost complete exclusion of other weeds. An empty lot in Park Street, Port-of-Spain, has been under observation by the author for a considerable time. It is almost completely taken over by the sedge, **Cyperus luzidae,** and although the weed has been twice cut down it has reappeared

just as before, dominating the whole area. How it got control of the area is not known but it may be that the conditions for growth on this lot are just right for this particular weed.

From what has gone before the impression may have been gained that the weed is invincible and will take over from and smother the plants on any piece of ground it has invaded. This of course is not true; otherwise the whole World would be covered by weeds. In actual fact a portion of land left to itself and given sufficient time will eventually support the maximum quantity and nature of vegetation for which it is capable. A portion of land exposed by a landslide but capable of supporting a tropical rain forest will at first be occupied by weeds. This will after a time be taken over by a form of vegetation commonly called 'lastro' in Trinidad. It is probably the most impenetrable form of vegetation that exists, consisting as it does of shrubs, small trees and vines, perhaps twenty to thirty feet high, growing very closely. Eventually the trees will outgrow the shrubs and will establish the typical rain forest with its high canopy of foliage, its numerous epiphytic plants and vines and its floor of shade loving plants. In this environment the weed has practically no place, principally because it is a sun loving plant.

The general feeling about weeds is that they are completely useless and only fit for eradication. Weeds in actual fact are of some use. First they provide rapid cover for land which has been deprived of vegetation by natural or other causes, thus preventing erosion of the top soil. Weeds such as **Crotalaria** can be used to provide a means of regenerating nitrogenous plant food in depleted soils. Weeds finally are of some use medicinally, although modern chemical technology is providing substitutes or synthesizing the very medicines produced naturally by the plants. A recent example of medicinal value is Coreilly **(Momordica charantia)** which is being tried out as a possible cure for cancer.

The purpose of this article is to change the prevailing attitude of indifference to these largely unwanted plants. The attempt has been made to shew that, although these plants are not of any great economic value, yet ecologically they are of immense interest. The aim and purpose of this article will have been achieved if any of its readers are moved to pay more attention to weeds or, preferably, to take up the serious study of a group of plants that can very aptly be described as tough little fighters.