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A Review on Spurry (*Spergula arvensis*) and Possible Ways of Controlling it by Chemical Means.

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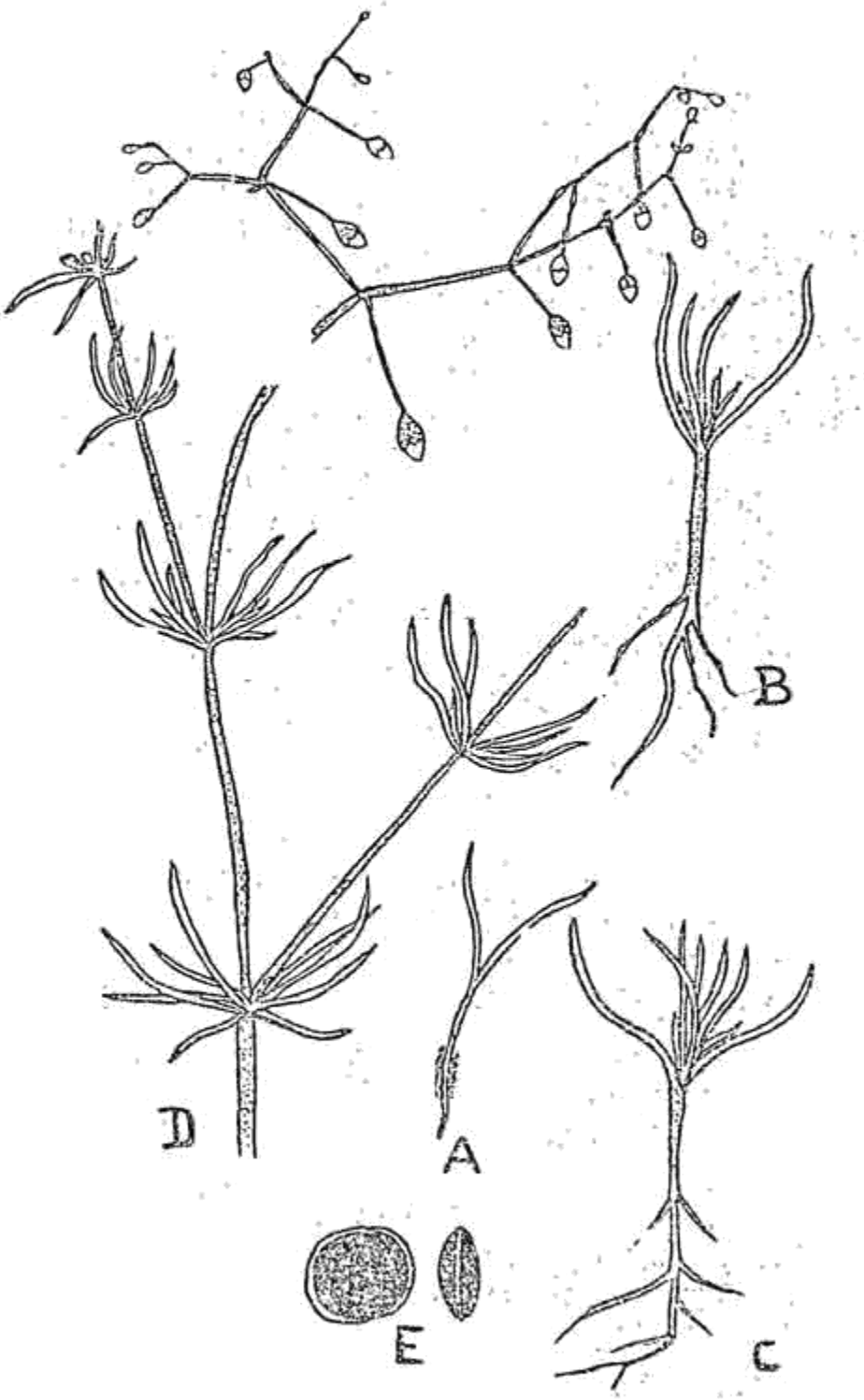
Introduction: The weed spurry (*Spergula arvensis*) which is native to Europe and later got established in U. S. A. (1) South Africa (2) Canada (3) India and other countries, has been reported in India even as early as 1874 by Bentham and Hooker (8). The authors do not describe it is an introduced weed, though it has been stated as a native of Europe, in the Bullettin of the Michigan State Agricultural College (1). Its introduction into India must have been long before 1874. No reference to it as an established weed in India, has been made either by Bentham and Hooker (8) or by Gamble (1928) (9) though both of them have described it as occuring in cultivated fields in the cool parts of India. In South India it is said to occur in the Kodaikanal and Nilgiri Hills (9) & (15). Hence it must have become a noxious weed through vigorous growth and effective self-propagation only recently. At present it has assumed threatening proportions especially in some tracts of upper Nilgiris, and according to an official report from Nanjanad, it is said to smother all the crops in the fields of the Agricultural Research Station there. Hence an attempt has been made in this paper to review the various chemical herbicides and to assess their usefulness with particular reference to spurry.

Spurry is generally found as dense growths in corn fields and other waste places. It is reported to be harmful to corn crops, root crops and clover crops. When plentiful it practically suppresses both spring and summer crops.

Botanical: *Spergula arvensis* is a member of the Pink family, *Caryophyllaceae*, which includes many weeds as chick-weed, *Stellaria*, *Agrostemma* and others. The plant is known as spurry or sand weed. It is an annual and is said to arise in sandy soils which are deficient in lime (4). In fact, the Ministry of Agriculture, England in one of its bulletins says that the presence of spurry is an indication of the deficiency of lime in the soils.

The plant is herbaceous and grows to a height of 6 to 8 inches. It is much branched and the stems bear two opposite leaves at the node. Actually however, more than two leaves are

found in the axils, but all of them except the primary leaves are the basal leaves of the axillary branches. These leaves arise between the primary leaves to give rise to a pseudo-whorl. The plant is sticky due to the presence of glandular hairs (Figs. A-E).



Explanation of Figures.

A—Young seedling of Spurry. B & C—Later stages of the seedlings. D—A flowering branch of the weed. E—Seeds as seen in two views (magnified).

The flowers are borne on loose terminal panicles. The seed capsules hang downward. Seeds are dull black, flattened or lens-shaped.

The seeds get dispersed more or less close by the mother plant and germinate during spring in profusion, forming seedlings with two green linear cotyledonary leaves. Thereafter their growth is very rapid and it is at this stage that it interferes with the nutrition of the crop plant and causes harm.

Control: Control measures aim at destroying the weed at its most susceptible stage. Generally the seedling stage is found to be most suitable one. As however, the plant thrives in lime-deficient soils, the Ministry of Agriculture, England (4) recommended thorough liming or chalking of the soil, followed by careful cultivation.

The possibility of chemical control of this weed has been investigated by Blackman (6). Among the chemical herbicides, the following have been tried for this weed 1. Sulphuric acid, 2. Copper sulphate, 3. Copper chloride, 4. DNOC (Dinitro-orthocresol), and the two growth hormones which serve successfully as weed killers, MCPA (2 methyl-4 chloro-phenoxyacetic acid) and DCPA (Dichloro-phenoxyacetic acid). All these six chemicals will be considered individually in detail.

1. *Sulphuric acid*: This is a contact herbicide and is useful for a variety of weed species belonging to several families. It is also known as Brown oil of Vitriol in its concentrated form, in which it is supplied by chemical firms. It is most suited to annuals which require only contact action. A 7 to 10 percent solution of the acid at the rate of 100 gallons per acre has been recommended by the Ministry of Agriculture, England. Blackman has recommended the use of this herbicide (5 and 6) and in the comparative study of the weed killers, has recorded that B.O.V (Brown oil of Vitriol) used as a 10 percent solution by volume at the rate of 100 gallons per acre destroys more than 90 percent of the spurry weed which is the maximum amount of control compared with all other herbicides (12). It can safely be used, with cereals and onion while the crops are young; in crops other than cereals the field should be sown late, after destruction of all the weeds that germinate in spring. This herbicide does not leave any harmful effects in the soil as it decomposes soon and hence sowing can be done immediately after spraying with this herbicide. Simple precautions, such as are necessary in handling strong acids need only be observed during its use.

2. *Copper sulphate:* is said to be effective when a 5 percent solution (20 pounds of the chemical in 40 gallons of water) is sprayed (4). The rate per acre is not given in the instructions, probably it is the same as for B. O. V.

3. *Copper Chloride:* This herbicide is said to be more effective than copper sulphate (5 & 6). With lower concentrations than is necessary for copper sulphate, more successful results can be got. As copper chloride acts quicker and acts on the weed irrespective of its stage of development it is definitely superior to copper sulphate. In Blackman's experiment a solution of cooper chloride at 20 pounds per 100 gallons, sprayed at the rate of 100 gallons per acre gave over 50 per cent control with spurry. Certain precautions are necessary with copper chloride. As dilute copper chloride solution is more corrosive to metals than dilute sulphuric acid all spraying machinery should be thoroughly washed *immediately after use.* Like sulphuric acid, copper chloride also does not leave any toxic residues and hence seeds can be sown immediately after spraying.

4. *Dinitro-ortho-cresol*-DNOC: The ammonium salt of this compound is found to be very effective in the case of several annual weeds in cereals at comparatively low concentrations. During the war a substitute for the ammonium salt was used, which is an activated sodium salt of the DNOC compound. It is prepared by mixing the required amount of the sodium compound (7—8 pounds) with 10 pounds of ammonium sulphate in 100 gallons of water. A wetting agent should always be used when this reagent is used. It is used in the form of pastes, which should be diluted with water after mixing with a wetting agent. Against spurry this herbicide gave over 80 percent control in concentrations of 6—8 pounds per 100 gallons of solution sprayed in an acre.

DNOC Compounds are poisonous to livestock and men when swollowed and hence no effort should be made to clean the nozzles and other parts of the sprayer by blowing into them. These impart an yellow stain to clothes, men's hair and skin. All these compounds are highly inflammable when dry, and therefore all machines used should be washed thoroughly before being dried. Clothes of operators which get saturated with the spray should also be thoroughly washed.

Unlike sulphuric acid and the copper herbicides, DNOC compounds leave toxic residues. Therefore when a field is sown after spraying it is necessary to wait at least for 10 days in the case of this herbicide.

5. *2–Methyl–4 Chloro phenoxy acetic acids:*—MCPA: This forms the active constituent of Methoxone, Agroxone, and CLC. With spurry, this gave the same amount of control as copper chloride. But there are many disadvantages attendant with the use of this chemical. The compound leaves toxic residues in the soil which affect the roots of the subsequent crops, if allowed to leach down into the soil. These residues remain for at least 6 weeks, and are equally harmful to germinating seeds. Blackman used a solution of 2 pounds of the substance per 100 gallons of solution sprayed in an acre, and got 50 percent control. Hudson (10) used a more dilute solution and did not get any decisive control over the spurry weed.*

6. *2-4-dichlorophenoxy-acetic acid, 2-4-D or* DCPA: This is the active constituent of Phenoxyl. The disadvantages of MCPA are applicable to this also. The exact herbicidal action is still not fully understood, and the strength of the solution that would effectively kill the weed without harming the crop is yet to be determined.

A comparison of the various herbicides described above reveals that sulphuric acid is the best as far as this weed is concerned. As this is not a perennial, and no root stock system is to be tackled, MCPA, and DCPA are neither necessary nor desirable. What is required is a suitable contact herbicide. Sulphuric acid has stood the test and gives the maximum amount of control. Its easy availability as a commercial product in South India (it is manufactured in Ranipet and Mysore) is an important consideration. All-copper rose-cans with a fine rose sprinkler could be got made locally. Next in importance comes DNOC compound. This can be experimented upon and the concentration of the herbicide to suit local conditions may be determined. But it has to be remembered that the use of a weedicide is not to be considered as an exclusive substitute for simple agricultural practices like scraping the surface of the soil with a Guntaka, working the cultivators between rows of crops and the application of these methods invariably before this shallow-rooted weed sets seed. A considerable saving in the quantity of weedicide can be made if the operation is done soon after the germination of the bulk of the weed seed.

* Recent experiments conducted at Ootacamund by the Government Mycologist have shown that the weed is easily killed in two weeks by spraying 0·2 percent MCPA at rate of 100 gallons per acre. This result indicates the superiority of MCPA even over sulphuric acid under conditions at Ootacamund.

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