Experiments were carried out in the rice paddies of a certain heavily contaminated district in Kanagawa Prefecture covering a period of several years. Summarized in the following are the results obtained thereof.

1. Optimal season for the spray of P.C.P. is the later half of June, when the rice planting season is over. In this season, the largest number of water snails can be found and the snails are most susceptible to the drug.
2. Concentration of P. C. P. recommended is 10 ppm.
3. Snails reduced remarkably in number by the spray continued for three years.

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Germination Test Seeder for Brassica Crops

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In the germination test, a given number of seeds is counted and arranged on a germination bed. The present garmination test seeder reported herein can pick up a given number of seeds and arrrange them in a regular manner on a seed bed. This tool is handy and cheap. It was, at first, devised for *Cruciferous* crop seeds, but it can be applied for other kinds of seeds by changing the attachment.

Structures

The germination test seeder is made of two main parts, the home electric cleaner as a sucking apparatus and the attachment for placing seeds on a seed bed as shown in Fig. 1-a. Any of the commercial cleaners can be used for this purpose if its suction power is sufficient. The attachment for placing seeds is put into the hose of a cleaner. It consists of three important parts, A, B and C as in Fig. 1-b.

A is a hole of plastic tube bundled by a thin iron band. This part functions as a controller of the suction power by changing the hole size. B is a swich cap which operates to drop seeds stuck to C. The cap at B is closed when seeds are being picked up, but it is opened at the time of placing seeds. C is an adhesion vessel with the plate made of a hundred small perforations. It can be exchanged at D with others corresponding to the seed size of different crops. The diameter of this adhesion vessel C used herein is 8.5 cm which fits well to a Petri dish.

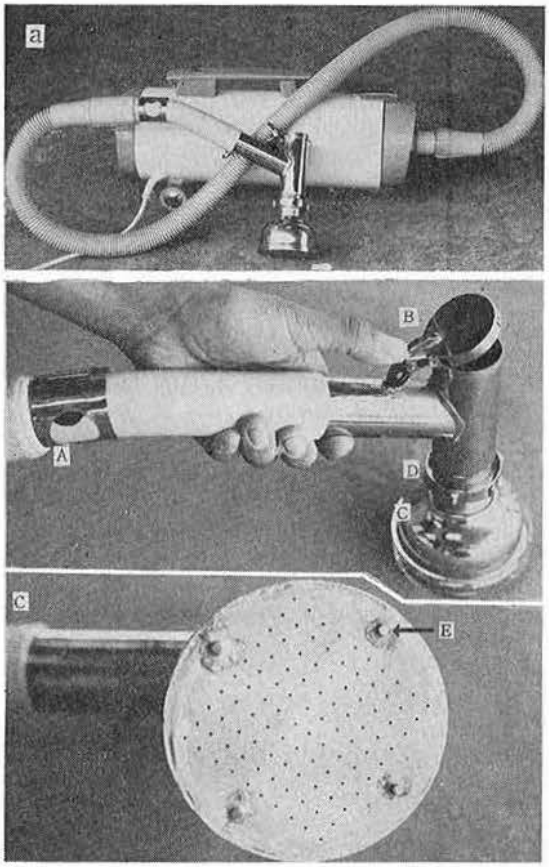

Fig. 1 Structures of the convenient germination test seeder.
a: A set of the seeder.
b: Attachment of the seeder.
c: Plate surface of the adhesion vessel C.

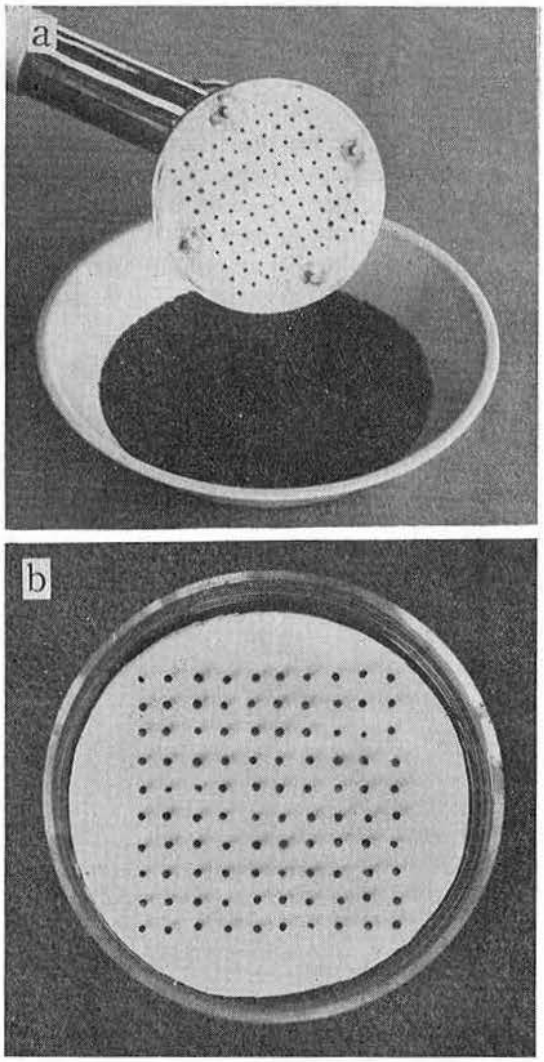

Fig. 2 Using procedures of the seeder.
a: Status of the seeds stuck to the perforations of the adhesion plate.
b: Status of the seeds arranged regularly on the seed bed.

As shown in Fig. 1-c, the plate surface of the vessel has a hundred small perforations arranged regularly and four projections denoted as E. The diameter of a perforation should be 0.8 mm and the distance between perforations 6 mm for rape and cabbage seeds. Generally speaking it appears to be desirable that the diameter of a perforation be somewhat small and the distance between perforations wide.

The height of a projection is 2 mm in rape seeds, and it should be slightly larger than the diameter of a given crop seed. Since the object of projection is to hold the adhesion plate in parallel to the surface of the seed bed, even three projections may be enough for this purpose. Anyhow, the existence and the appropriate height of the projections play an important role in arranging seeds on a seed bed regularly. Consequently, the perforation diameter, the distance between perforations and the projection height should be changed corresponding to the different crop seeds.

Usage and efficiency

A given seed sample is put in a receptacle with a flat bottom as shown in Fig. 2-a. The adhesion plate of the seeder is placed on the mound of a seed sample and the switch of the cleaner is turned on. At that time the cap B of the attachment is closed. If the cleaner can be operated by a foot switch, the operation becomes easier.

When the switch is truned on, the seeds are stuck fast to the perforations of the adhesion plate. Whether the seeds are attracted on each hole of the plate or not, can be observed by turning the plate as shown in Fig. 2-a. When more than one seed is attracted at a perforation, extra ones can be removed easily by touching gently on those seeds with a finger or by tapping lightly against the adhesion vessel.

After confirming the existence of a hundred seeds the adhesion vessel is placed on the seed bed and the switch of the cleaner is turned off by the foot switch. Just after turning off the switch the cap of B is opened by holding down the thumb knob of the cap and then rapidly closed again by releasing the knob. Following these operations all seeds drop down on the seed bed and regularly arranged on it. It is preferable that two sheets of filter paper are used and water is not supplied too much on the seed bed.

For counting the number of seeds there is a simple seed counting plate which has the similar structure as a coin counting one. It is a metal plate with a hundred pits to fit a seed into a pit. The seed counting plate is convenient and efficient in the case of counting number of seeds only.

The efficiency of the germination test seeder in the case of rape seeds was compared with seed counting plate or with customary hand treatment. In the seed counting plate a hundred seeds were taken and placed them on a seed bed one by one by using a pincette. In the hand treatment, seeds were picked up and arranged one by one on a bed by handthrough counting a hundred seeds. Two persons, M and N, were engaged in this experiment with five repetitions. The result is shown as an average time required to place seeds on a seed bed.

Table 1. Time required for placing 100 rape seeds on a seed bed by different methods.

Person	Hand treatment	Seed counting plate	Germination test seeder
	sec.	sec.	sec.
M	124	93	36
N	140	86	22
Average	132	89	29

The average time required was only 29 seconds in the case of germination test seeder. On the other hand, in the case of hand treatment and the seed counting plate the time was 132 and 89 seconds respectively. It was evident that placing of seeds was faster and observation of the germination was easier in the germination test seeder than in the other methods.

When this tool is used for the crops other than *Brassica*, the adhesion vessel C should be exchanged for another one with a different perforation size, distance between perforations and projection height of the adhesion plate as shown in Fig. 1-c. For example, the size of a perforation may be adequate to be 0.5 mm for seeds of celery and clover and 1.2 mm for radish.