

**USE OF PLASTIC TUBES
IN RAISING BEET SEEDLINGS**

MET SAMENVATTING
HET GEBRUIK VAN POLYAETHYLEEN KUNSTDARM
VOOR STEKPOTTEN BIJ VEREDELINGSONDERZOEK
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G. CLEY

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USE OF PLASTIC TUBES IN RAISING BEET SEEDLINGS

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ABSTRACT

A method is described for the use of plastic tubes in stead of common pots for raising seedlings in beet breeding work.

The tubes have the advantage in that they are light, take little space and give roots with a better shape, resulting in less tare at the harvest. Part of the preliminary work can be done in winter. A disadvantage is that plastic does not decay in the soil and may cause inconvenience when a succeeding crop is grown. The yield of beets planted in tubes is equal to that obtained with normal culture in the open. The cost of about 1 Dutch cent per tube need not be an objection to using it in field trial work. The tubes can be also used to good advantage with other crops in glasshouses.

1. INTRODUCTION

At the S.V.P. some tens of thousands of seedlings are raised in pots every year and later transplanted in the field. Of some seed lots there is sometimes too little seed available or the germination capacity is so low that they cannot be sown directly in the field. Therefore the seed is sown in flats and the seedlings are later transferred into pots. Within some weeks the hardened seedlings can be planted in the field.

In using this method a trial field can be laid out even when little seed is available. This is impossible normally because then eight to ten times as much seed should be available to obtain a normal stand after thinning.

From our trials it has appeared that with the old transplantation method normal yields can be obtained, but the form of the beets is often bad when lifted and in particular sugar beets grow very fangy. The main cause lies in the method of pricking off; the tap root of the beet has become rather long then and the seedling is planted in a pot of 7 cm depth. The main root of a beet grows fairly rapidly and after some weeks it is found rolled up at the bottom of the pot. Of course it is possible to use larger and deeper pots but these are very heavy and take much space and soil. Long tubes, for example drain tubes, are also heavy and difficult to knock out. Long narrow soil blocks are inconvenient and often disintegrate.

POLÁK (2) describes a method whereby seedlings are raised in 20 cm long bottomless paper tubes and later planted in the field with the tubes attached to them. In using this method the chance of a slow start as a result of unfavourable weather in early spring is avoided and higher yields are obtained. However, he does not describe the kind of paper he uses and in our own experiments all kinds of paper used appeared to be unsuitable. They decomposed so rapidly that the tubes could not be handled during planting.

FROST (1) used pots of specially prepared paper in raising lettuce seedlings and

obtained good results. It is true that when the seedlings were planted after six to seven weeks the pots are partly decomposed, but this caused no difficulties here since the pots were only 2 in. deep. However, when deeper pots are used, they cannot be removed from the boxes without injury, according to our experience.

2. A NEW METHOD

After failing to adapt these methods we have devised a new method, viz. by using polyethylene tubes of 10 cm in circumference (\varnothing 3 cm) and 0.05 mm thickness. Pieces of 20 cm length were cut off and these were closed on one side with two staples. These tubes were filled with pot soil in which the seedlings can be pricked out or sown directly. The main root can now reach a length of 20 cm. without being disturbed so that a less fangy beet is obtained. With a narrow drill, holes 21 cm. deep are dug out in the field into which the tubes are planted. Prior to planting they are cut open lengthwise, resulting in a better contact with the surrounding soil and consequently a better provision of water for the roots. The tap-roots can penetrate the bottom of the tubes through the aperture between the staples and so provide the seedlings with water and nutritive salts.

Plastic tubes are light and take much less space than baked pots so that more plants can be placed in a frame. Filling of the tubes with soil can be done in winter; they can be put aside in boxes (Fig. 1). Sowing or transplanting can be carried out very rapidly when the tubes are put in numbered boxes and for each seed lot a separate box is provided. Planting also proceeds very speedily: there is little transportation work and there is no need of collecting empty pots as is required when ordinary planting pots are used (figures 2, 3 and 4). A disadvantage is that this plastic is impermeable to water. Therefore cuts must be made lengthwise in the tubes during planting or the tubes must be perforated before filling them with soil. Plastic is not corroded by soil and this may be an inconvenience for the succeeding crop.

There is only little experience with the use of plastic tubes in other crops. In the case of beets the advantage is that on account of the secondary growth of the beet the tubes are rent to pieces, resulting in a good contact of the roots with the surrounding soil. Sun flowers appeared to thrive in them and allowed transplantation easily. In glass-house trials also the tubes can be used to good advantage, particularly when young plants are being handled. The tubes take less space than pots, which is a great advantage when artificial light must be used because then more plants can be placed under each lamp.

The price per kg. artificial tube is 9.60 guilders. From this amount some 1,000 tubes can be made, requiring 2,000 staples costing 50 cents, so that the total cost of one tube is one Dutch cent. This cannot cause an objection for application in field experiments.

3. RESULTS

In 1956 an experiment was carried out comparing normal sowing in the field and planting in plastic tubes, using the sugar beet variety K.W.E. The seeds were sown in

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FIG. 1. FRAME WITH BOXES CONTAINING PLASTIC TUBES WITH TRANSPLANTED BEET SEEDLINGS

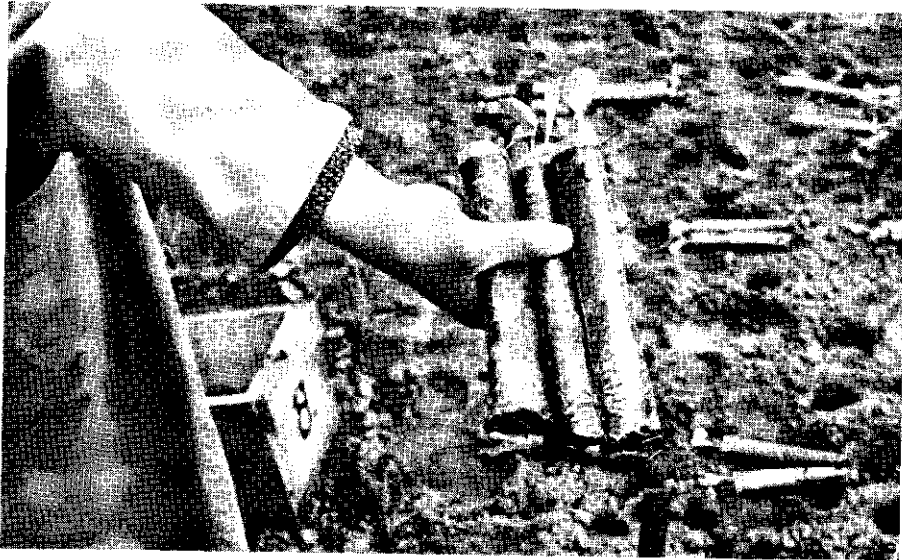


FIG. 2. PLASTIC TUBES ARE LAID OUT IN THE FIELD



FIG. 3. CUTTING THE TUBES LENGTHWISE BEFORE PLANTING



FIG. 4. PLANTING THE TUBES

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FIG. 5. MUDDY AND FANGY KWIF BEETS ON HEAVY CLAY SOIL AFTER NORMAL SOWING



FIG. 6. WELL-FORMED BEETS WITH LITTLE TARE RAISED IN THE SAME SOIL AS IN FIG. 5, AFTER PLANTING THEM IN PLASTIC TUBES

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heavy river clay on 12 April and in plastic tubes in a cold glasshouse on 13 April. On this date also seeds were sown in a flat and the resulting seedlings pricked out in plastic tubes on 28 April. The tubes were planted in the field on 4 May. On account of the cold and dry weather growth started with some difficulty, but after some time the plants developed successfully. The stand during the summer was on average somewhat better than that of the beets which were sown directly in the field. The beets were lifted on 16 October and the yield was determined. On this heavy clay soil there was a conspicuous difference in tare in favour of the beets planted (figures 5 and 6). Three replications of 84 beets each were lifted and the relative sugar production of the plants sown in the field, the plants directly sown in plastic tubes and those which were first sown in flats and later transplanted into plastic tubes were 100, 118 and 98, respectively. In particular the beets which were directly sown in tubes had an extremely good form. The transplanted beets were somewhat fangy and the yield also was somewhat lower than that of those sown in the field.

In 1956 the yield of beets raised in pots was compared with that of beets raised in plastic tubes on a trial field laid out on humous sandy soil. The experiment was set up in triplicate and the relative sugar production was 100 and 102 respectively. On this moist-soil the plants rooted better than on the clay soil and there was at first no retardation of growth.

In 1957 some 12,000 plastic tubes were used for raising reserve beets for the trial field. The plants developed excellently, of this reserve material no yields were determined. Part of the tubes had been field up with vermiculite. This can be quite conveniently used and a box of filled tubes is easily managed due to its small weight. However, the plants in vermiculite had a slower development than those in pot soil, in spite of a regular food supply. There was no difference between vermiculite with a pH 9 and one of pH 6.2.

In 1958 one of the virus yellows trial fields on sandy soil was laid out with the aid of some 18,000 plastic tubes. Planting proceeded much smoother than when pots were used and the beets showed an excellent development. The yields were practically equal to those of the normally sown beets on the same field. The average yield of the seven plots sown with K.W.E. was 62.6 tons of beets per ha. with a sugar content of 14.55 %, and that of the five planted plots 61.7 tons per ha. with a sugar content of 14.48 %.

In the case of the variety Hilleshög Standard these figures were 51.2 tons and 15.11 % and 53.2 tons and 15.10 % sugar, respectively.

Skip correction is still an ardent wish of the beet breeder and the great advantage of these planted plots was that there were very few gaps, which facilitates the interpretation of the results.

SAMENVATTING

Het gebruik van polyaethyleen kunst darm voor stekpotten bij veredelingsonderzoek in bieten

Er wordt een methode beschreven om zakjes, gemaakt van polyaethyleen kunst-darm te gebruiken in plaats van gewone stekpotjes voor de aanleg van geplante bieten-proefvelden. De zakjes hebben o.a. het voordeel dat ze licht zijn, weinig plaats innemen en door de grotere lengte beter gevormde bieten geven, wat weer resulteert in

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minder tarra bij het rooien. Een gedeelte van het voorbereidende werk kan gedurende de winter geschieden. Een nadeel is dat plastic niet verteert in de grond en last kan geven bij een volgend gewas. De opbrengst van de met zakjes gepote bieten is gelijk aan die verkregen met normale zaai in de volle grond. De kosten aan materiaal van \pm 1 cent per zakje zijn geen bezwaar voor proefveldwerk. Ook voor kasproeven met andere gewassen zijn de zakjes uitstekend bruikbaar.

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