



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

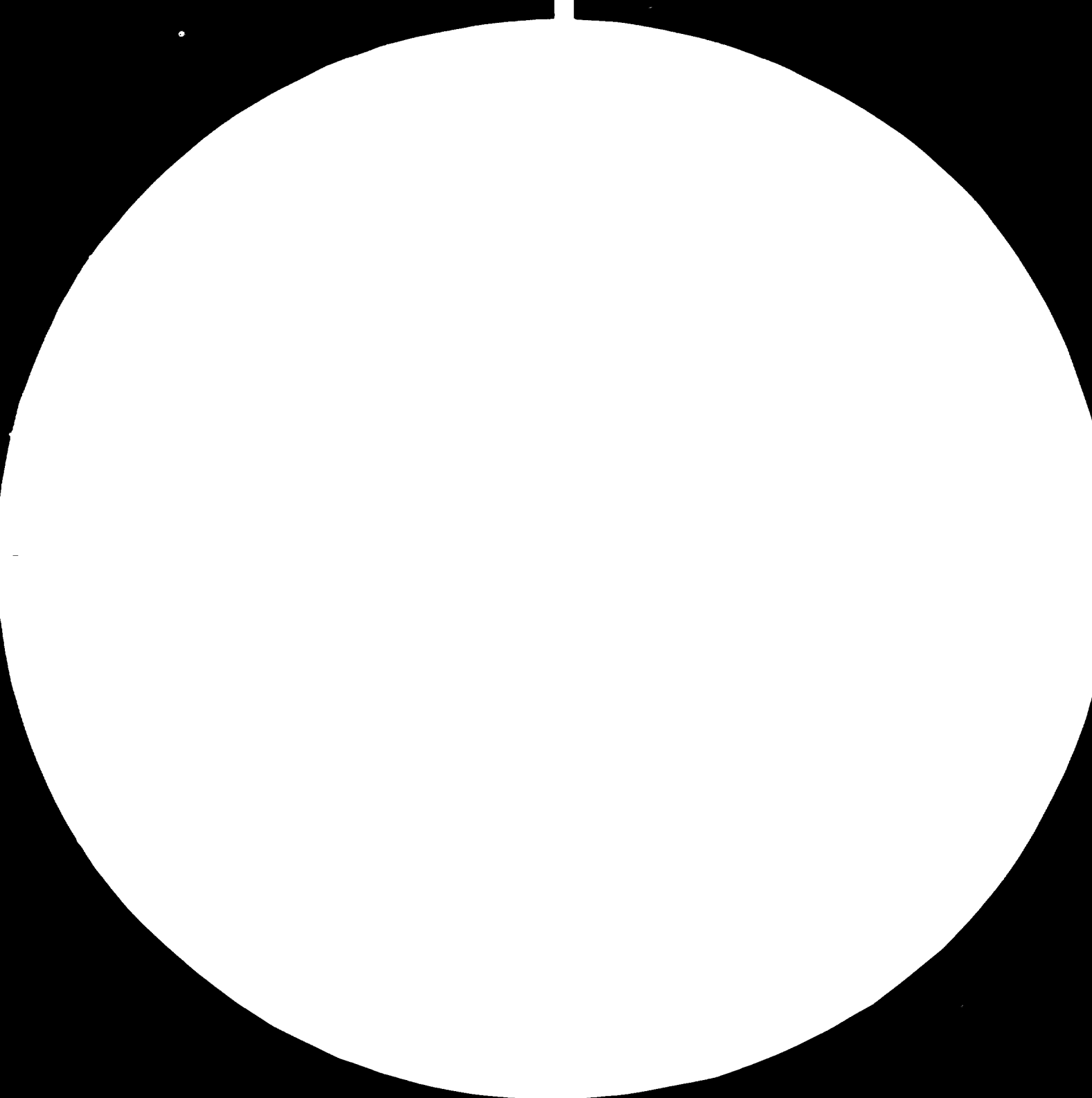
## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)





3.6

4.0



Minimum Resolvable Detail (cycles/mm)

10326

DP/EGY/77/004/11-02G

(R)

Plastics Development Centre

Report for the Government of Egypt

Mission Findings and Recommendations

22 November to 19 December 1980

by

H.R. Spice

expert of the United Nations Industrial Development  
Organization acting as Executing Agency for the  
United Nations Development Programme

001-00

1. Diary

The night of 22nd November was spent in Cairo and the morning of the 23rd was occupied in the U.N. office. The car journey to Alexandria was undertaken on the afternoon of the 23rd November.

The period between 23rd November and 15 December was spent on visits in the environs of Alexandria. Return to Cairo was on 16th December.

2. Visits made

It is not proposed to detail visits to individual farms, companies or organizations made in Alexandria, since the practical results of these visits are listed below.

A formal slide lecture on 'The Uses of Plastic Films in Agriculture' was delivered to the Agricultural Faculty of the University of Alexandria on 10th December.

A similar but shorter presentation was made to U.N. staff and some invited guests on 16th December, in Cairo.

A comprehensive tour of the University of Alexandria Experimental Farm was made with the Dean of the Faculty, and P.D.C. staff on the morning of 11th December, and in the afternoon of that day a discussion took place with the head of the Poultry Section, who showed great interest in the use of polyethylene films as a cladding for low-cost structures to house poultry on some of the proposed resettlement programmes.

On the 17th December a meeting at the Irrigation Institute in Cairo under the chairmanship of Professor Hasun Wahpy was attended and a short presentation on the potential use of plastic films for canal linings was made.

On the 18th December a visit was made to the Experimental Farm at Kaha, where approximately one feddan of plastic greenhouses are

currently in operation, growing tomatoes, sweet peppers, cucumbers, beans and melons. This enterprise will shortly be extended to some 5 feddans of greenhouse area and will include modern multi-span units with environmental control facilities. The Kaha project is designed to assess the economic possibility of exporting produce by air to Europe during the winter months.

3. Practical work accomplished

It was possible to effect very little in the way of practical field trials, though a modest start was made on two holdings, as follows:

3.1. A tunnel greenhouse covering a ground area of 4m x 18m was made and erected on a farm near Alexandria. The framework was made from hoops of 1.25cm internal diameter galvanized steel tubing set at 1 $\frac{1}{2}$ m intervals, and it was covered with 6.5m wide clear ultra-violet-light inhibited polyethylene sheeting, 180 microns thick, of French manufacture.

3.2. Mulching: Very small mulching trials were made on established tomatoes on two locations, using both clear and black polyethylene sheeting. In the absence of thinner films 180 microns clear u.-v.-i. sheeting was used, purely to demonstrate the technique. The small amount of black film available (derived from the packing of the rolls of polyethylene imported from France) was used on a mulching trial.

3.3. Low tunnels (wine-supported): Two short lengths of tunnels were erected over established tomatoes, largely to demonstrate the 'Nantais' method of supporting film above crops with curved lengths of galvanized wire.

3.4. Protection of crops with wide perforated polyethylene sheeting: Two rolls of clear perforated film, each 100m x 10m, arrived in Alexandria in late November. Two trials, each covering an area of 10m x 10m were initiated, in both cases over established tomatoes.

3.5. Illustrated article: The P.D.C. proposes to produce a journal or magazine at regular intervals in order to publicise their work. An illustrated article with the title 'Plastics in Agriculture - The Potential in Egypt' was written for the first issue scheduled for March 81.

4. Applications of plastics in agriculture likely to be significant in Egyptian agriculture in the next few years

Note that the following observations apply to flexible plastic films, mostly polyethylene, rather than rigid plastics in the form of pipes, tubes, irrigation nozzles etc.

4.1. Canal and reservoir linings

This application evoked considerable interest whenever it came up in discussion and could be of enormous importance since suitable polyethylene films are likely to be made in Egypt during 1981.

The films required should be available in seamless widths of from 5 - 10m, black in colour and made in thicknesses of around 250 microns.

Methods of joining such sheeting on site have been discussed with P.D.C. staff. Heat sealing is not recommended and if locally-made adhesive tapes of suitable quality are not available it is suggested that these should be imported.

4.2. Plastic greenhouses

The need for greenhouses in the benign Egyptian climate has been questioned although the use of an inexpensive plastic greenhouse on many farms to produce quality transplants for subsequent field planting would seem justified economically.

It would undoubtedly be possible to produce quality crops of tomatoes, peppers, cucumber and melons throughout the year in sophisticated greenhouse structures but the economics of such production, especially for local consumption, could be questioned.

It should be noted that, once any greenhouse structure has been erected it can be covered with either shade netting (to reduce

temperatures - or to protect against birds, for example) or white-pigmented polyethylene film, in order to produce an environment more suitable for the plants or crops grown.

#### 4.3. Low tunnels - or row-crop covers

This application could increase and improve quality of winter and early spring production of crops like tomatoes. It is an attractive application since, like mulching, suitable plastic films of between 40 - 80 microns thickness can already be made in Egypt.

One grower visited had already started to erect inexpensive frameworks over tomatoes, and was covering these with sheets of polyethylene film made from old plastic sacks, cut open and sewn together to form large sheets. The P.D.C. could encourage such enterprise by making available more suitable films, and by publicising any method of supporting the films above crops which proves satisfactory under Egyptian conditions.

#### 4.4. Wide clear perforated sheeting for crop production

This technique, whereby large perforated sheets of thin polyethylene films in widths of up to 10m are placed over field crops would seem to offer considerable promise on winter crops of potatoes, determinate varieties of tomatoes, and cucumbers and melons.

Enough perforated film has already been imported into Egypt for this season's trials and hopefully local production will be available for the winter of 81/82. It could be noted that a greater degree of perforation may be required for Egyptian conditions than for N.W. Europe.

#### 4.5. Windbreaks

Plastic windbreaks are of particular interest in land areas being brought into production, and especially in regions of lighter sandy (desert) soils. They can be used to assist in the rapid establishment of living windbreaks, and do not, of course, compete with the crops for moisture.

Many kinds of plastic windbreaks have been developed and their merits were discussed with P.D.C. staff. The supporting structure for any type of windbreak must be substantial and fortunately suitably strong locally-grown timber (such as *Cassuriana*) is available.

#### 4.6. Shade areas

Plastic shading materials have much in common with those used for windbreaks, but as they are not subjected to similar wind stresses



can often be less substantial and consequently cheaper.

#### 4.7. Plastic mulching

This application is perhaps the one most likely to be economically worthwhile, and which could absorb a very considerable tonnage of (pe) films over the next few years. It is a technique which will become of increasing importance in areas where water is in short supply, and where soil salinity problems arise.

Egypt can already produce suitable films - ie. well-pigmented black films of from 40 - 60 microns thickness, from 80 - 120cms wide.

#### 4.8. Silage

The Agricultural Faculty of the University of Alexandria were extremely interested in using plastic films for conserving green fodder crops, and had already imported some wide seamless polyethylene sheeting for initial trials.

Few farmers in Europe now consider making silage without using plastic films. With the higher storage temperatures pertaining in Egypt the use of plastics in silage making is likely to prove even more rewarding.

#### 4.9. Some miscellaneous applications

Very many minor applications of plastics in agriculture exist and it is perhaps in these minor applications that the P.D.C. can advise the choice of the most suitable available plastic.

Four such applications are mentioned below:

##### 4.9.A. Agricultural Buildings

As a roofing or cladding material for many kinds of farm structures black polyethylene sheeting is the cheapest material available, and also the lightest in weight. Sheeting of around 250 microns thickness is most commonly used, and this is often painted with a white or reflective paint in order to reduce internal temperatures. Interest in low-cost polythene clad structures for poultry was expressed by the scientist in charge of poultry at the University of Alexandria.

#### 4.9.B. Polyethylene sleeves for bananas

In many banana-producing countries the developing fruits are protected by sleeves or tubes of thin polyethylene films, usually from 40 - 60 microns thick. Sometimes the films used are coloured -often blue. In Australia a reflective film reduces sun-scorch on the fruits. Both quality and weight of the bananas can be improved.

#### 4.9.C. Polyethylene film pots

These are generally made from gusseted black layflat polyethylene tubing and the film thickness increases with the size of the pot. Adequate drainage holes are essential and the film should be loaded with finely divided carbon, black to ensure durability in sunshine. Polyethylene film pots, when correctly handled, normally give better results than conventional clay pots and, of course, are less liable to breakage and much lighter in weight.

#### 4.9.D. Grain storage

This application was not discussed with any of the agricultural scientists encountered on the visit. It could be an interesting subject when wide seamless polyethylene sheeting is made in Egypt.

### 5. Plastic films to be imported - a suggested list

At a meeting of all P.D.C. staff in Cairo on 16th December a discussion took place on what materials and equipment should be imported in order to initiate trials with minimum delay, and the following list made.

The tabulation below tallies with Section 4 above.

A list of U.K. suppliers is given in Section 7 below. It is

suggested that any quotations for large amounts of polyethylene film should also be sought from other European suppliers such as France, Germany and Italy.

#### 5.1. Canal and reservoir linings

The material required is 250 microns thick black polyethylene film, in seamless widths up to 10m, although widths above 5 or 6m would also be suitable.

Quantity suggested is 600m x 10m, or around 6,000 square metres. Both will be approximately 25 or 30m long.

Good quality plastic-backed adhesive tapes will be required for jointing. The tape is made from tensified polyethylene film and is 250 microns thick, with an adhesive layer of about 100 microns. An excellent tape is called Polythene Pipe Wrap Tape, Type 1408. Rolls are 7.5cms wide by 30m long. The quantity required will be 1,000 lineal metres.

#### 5.2. Plastic greenhouses

An adequate supply of U.V.I. film is already available in Egypt. However, it is sometimes necessary to join sheeting, using adhesive tapes and stapling pliers which make use of a broad copper-coated staple. A suitable stapler is an Industria Stapling Plier, Type 800. It is suggested that two such staplers are imported, together with 20,000 staples.

#### 5.3. Low tunnels

None is required since suitable films can be made in Egypt.

#### 5.4. Wide seamless perforated clear films

Adequate amounts of film for trials presently proposed are available.

#### 5.5. Windbreaks

The P.D.C. consider that a small importation of conventional windbreak material is justified. Two excellent (but expensive) ones are Paraweb and Netlon.

Amounts suggested are: 2 x 30m lengths x 2m high Paraweb  
2 x 30m x 2m Netlon

Tildenet is a very durable knitted polyethylene fabric which can be used for windbreaks or shade areas. It is suggested that 1 000

square metres of 50% permeability should be imported.

12.5cm x 12.5cm mesh black netting can be used in conjunction with strips of black polyethylene film to form windbreaks or shade areas. Again, it is suggested that 1 000 square metres should be imported.

Of the last two items (viz. Tildenet and 12.5 x 12.5cm mesh netting) it is proposed that 500 square metres of each should be used for shade areas - see 5.6. below.

#### 5.6. Shading - shade areas

See last two items under Windbreaks 5.5. above.

#### 5.7. Plastic mulching

5.7.A. It is suggested that 3 rolls of standard black mulching films, 38 microns, 1 300mm x 200m are imported from U.K. or France to compare with local production. (The important comparison concerns the amount of carbon black pigmentation, and its dispersion).

5.7.B. As far as is at present known, reflective mulches are only easily available from America. It is suggested that 1 000 lineal meters of such reflective film is ordered.

#### 5.8. Silage

Suggested ordering quantity:

10	rolls	125	microns	black	pe	sheeting	40m	x	8m
10	"	"	"	"	"	"	40m	x	11m

#### 5.9. Agricultural Buildings

It is suggested that the relatively small amount of film required for this application is taken from that allocated to Sections 5.1. and 5.8. above.

### 6. Recommendations

6.1. While the current P.D.C. staff are full of enthusiasm and technically well qualified and competent, none has previous experience of the

agricultural industry. Consideration could be given to the full time employment of an agronomist. Such a person should preferably be a graduate, but someone with enthusiasm and a basic knowledge of local agricultural practice would be equally suitable.

6.2. In the absence of an agriculturist on the P.D.C. staff close liaison with agricultural teaching organizations, local FAO projects on bodies with staff able to appreciate how plastics can improve agricultural practice is essential.

6.3. The following recommendations relate to the application previously discussed under headings 4 and 5 above. Not all of them are likely to be initiated or implemented in the immediate future.

6.4.1. Canal and reservoir linings: This application has such potential that it is strongly recommended that suitable film is imported for any reasonable trials which are requested. The interest is such that enquiries are likely to come to the P.D.C. rather than the P.D.C. needing to seek suitable trial locations.

The Indian Petrochemicals Corporation Ltd., P.O. Petrochemicals, Dist. Vadodara 391 346 Gujarat, have recently issued a 'Manual on Canal and Reservoir Linings with Low Density Polyethylene Film' which seems to be relevant to the situation in Egypt. A copy of this manual was requested by air mail post, by telegram, during the visit.

6.4.2. Greenhouses: Close contact should be maintained with the Kaha Farm Project, if only to familiarize P.D.C. staff with the general principles of greenhouse cultivation.

The P.D.C. may feel justified in erecting several small 4m wide tunnel greenhouses on selected locations, for example, on the farms of the Universities of Alexandria and Cairo. But, in general, such tunnels should only be erected where a specific demand exists (e.g. for transplant production).

6.4.3. Low tunnels: Short runs (lengths) of wire-supported tunnels should be erected wherever there is an interest in this application. Encouragement should be given to any grower who is already making protective structures for covering with plastic films, however primitive these may be.

If low tunnels become popular to improve production of vegetables during the winter months, they will probably need to be installed from late October. However, low tunnels could also probably improve early season production of, particularly, cucurbits - especially melons and watermelons.

6.4.4. Perforated film protection: The 10m wide perforated film now with the P.D.C. should be distributed on as many farms as possible, without delay, in areas of about 10m x 10m.

It is particularly recommended that about 50m x 10m of this perforated film should be given to the Kaha project, since this simple and inexpensive method of winter protection could possibly increase the tonnage of export quality tomatoes to supplement those grown in the greenhouses.

It is tempting to recommend that several varieties of tomatoes should be planted on trial plots in 1981 in order to assess if any particular cultivar responds particularly well to this form of protection. However, supervision of such a trial would place an unreasonable work load on PVC staff. It is the type of trial which might be welcomed as a post-graduate exercise in an agricultural university.

6.4.5. and 6.4.6. Windbreaks and shade areas: These two applications can be considered together.

It is suggested that the imported materials listed under 5.5. and 5.6. above should be put into use as soon as possible after arriving in Egypt.

If a big demand for plastic windbreaks and shade areas develops it is suggested that the combination of netting and black polyethylene film strips should be pursued, seeking a local source of durable square mesh plastic netting in the range of 8 x 8cms - 16 x 16cms.

6.4.7 Mulching: As soon as a suitable local source of thin black polyethylene film is located as many trials, on as many types of crops as possible, should be started. These trials need not be on a large scale - a 20m length of mulch on any crop would indicate if a positive response is obtained.

Whenever possible the mulch should be applied to bare soil before the crop is planted, making cross-cut incisions in the mulch at locations where the plants are set out.

For early crops of melons, watermelons and cucumbers (where

these are sown as seeds, rather than planted) clear film should be used to induce higher soil temperatures. | In this case the clear mulch should be applied after seed sowing. When the seedlings emerge, a small area of film is removed to allow the plants to grow through the plastic.

The main advantage of the reflective mulches which will be ordered from the U.S.A. can be expected during the summer months.

6.4.8. Silage: Silage trials should initially be under the supervision of the Agricultural Faculty of the University of Alexandria.

The Resident Representative suggested that a Dr. Michael Creek of the Beef Industry Development Project, Mariut, should be kept informed of any silage trials, and that he may wish to collaborate.

7. Names of U.K. suppliers, with addresses: Several letters requesting samples and prices were sent on behalf of the Director of the P.D.C. during the visit, so some of the names and addresses listed below are already on file.

A copy of the most recent, annually issued, 'Reverence Special' booklet issued by the U.K.-based trade paper called 'The Grower' of 49 Doughty Street London W.C.1, was requested by post. This publication lists almost every manufacturer and supplier of plastics used in agriculture and horticulture.

#### Polyethylene films

The two largest U.K. manufacturers are:

- 1) I.D.I. Plastic Films Division,  
Welwyn Garden City,  
Herts.
- 2) B.C.L.,  
Bridgewater,  
Somerset.

A smaller manufacturer who is experienced in the formalities involved in exporting and supplies many plastics to the Middle East is:

Zedcor Ltd.,  
P.O. Box 8,  
Witney,  
Oxon.

Telex 837648 DIPSUP

The name of the principal is Mr. Richard Flint.

Adhesive tapes

The best tape available in U.K. is called 'Polythene Pipe Wrap Tape, Type 1408'. The most convenient width is 7.5cms, and a roll is 30m long.

It is made by:

Adhesive Tapes Ltd.,  
Borehamwood,  
Herts.

It is likely that an agency for this tape exists in Egypt.

A tape of similar quality is made by:

The Minnesota Mining and Manufacturing Co.

This is an international company who again are likely to have an agency in Egypt.

Windbreaks

'Paraweb', made by:

I.C.I.  
Hookstone Road,  
Harrogate,  
Yorkshire.

A supplier who would despatch relatively small amounts of Paraweb overseas is:

Fordingbridge Engineering Ltd.,  
Barnham,  
Bognor Regis,  
West Sussex.



'Netlon' (windbreak), suppliers (and manufacturers):

Netlon Ltd.,  
Blackburn, Lancs.

'Tildenet' (shade netting and windbreaks), suppliers and manufacturers:

The Tilden Group,  
Wyvern House,  
Anchor Road,  
Bristol BS1 5TT

'Polythene Netting' 12.5cms x 12.5cms mesh, supplied by:

Bridport - Gundry Ltd.,  
Bridport,  
Dorset.

'Stapling Pliers' suitable plier, using a broad copper coated staple is made by:

British Industrial Fasteners Ltd.,  
Gatehouse Road,  
Aylesbury, Bucks.

The stapler is a Type 800 .

The staples are Type 814.

'Reflective Plastic Mulches', American manufacturer is:

Polyagro Plastics Inc.,  
Second and Depot Streets,  
Bridgeport, PA 19405  
Pennsylvania, U.S.A.

8. Contacts made in U.K. since return on 19 December 1980

- i) Leaflets on the making of silage have been requested from the British Ministry of Agriculture and these will be posted to P.D.C. as soon as they arrive.
  
- ii) At the request of Dr. Arafa Arafa, Dr. J. Moore of the Agricultural Research Institute in Dublin was contacted by telephone on Monday 22nd December. He (Moore) had not received a telex requesting information sent by Dr. Arafa Arafa early in the week beginning 14th December.
  
- iii) A phone conversation with Mr. C.A. Brighton indicates that he will be prepared, if requested, to visit Egypt on a 4 week consultancy early in 1981. He (Brighton) is also sending the Director of the P.D.C. a copy of a paper on the use of polystyrene granules for soil or compost improvement.
  
- iv) The P.D.C. requested copies of some transparencies covering the major applications of plastics in agriculture. It is proposed to deliver a selection to Unido for copying at the conclusion of the visit to Mexico in February 1981, with a request that they should be copied.



