

PN-ABT-226
1994

MAHAWELI ENTERPRISE DEVELOPMENT

MED/EIED PROJECT

(USAID/Sri Lanka Project No. 383 - 0090)
(Contract No. C-00-0031-00)

PACKHOUSE QUALITY ASSURANCE MANUAL

by
K.D. Brandon

September, 1994

Report 5/1994



INTERNATIONAL SCIENCE AND TECHNOLOGY INSTITUTE, INC.

WITH :

ERNST & YOUNG CONSULTANTS (Sri Lanka)
DEVELOPMENT ALTERNATIVES, INC.
HIGH VALUE HORTICULTURE, PLC.
SPARKS COMMODITIES, INC.
AGROSKILLS, LTD

CONSULTANTS TO THE MAHAWELI AUTHORITY OF SRI LANKA

Mahaweli Enterprise Development (MED)

The development of the natural and human resources of the Mahaweli river basin is a high priority of the Government of Sri Lanka. The construction of physical infrastructure, the settlement of the land and the formation of the agricultural production base are largely completed. The challenge now is to build a diverse, dynamic economy capable of steadily raising Mahaweli family incomes. In meeting this challenge, the private sector - farmers, entrepreneurs, companies, community groups, non-governmental organizations - has an important role to play.

MED is a project of the Mahaweli Authority of Sri Lanka and the United States Agency for International Development. MED promotes investment and employment generation by the private sector in non-farm economic activities and contract outgrower programs producing diversified crops. MED does this by: (i) developing technical, marketing, financial and other services which assist self-employed individuals, microenterprises and companies to start and improve their businesses; (ii) developing entrepreneur associations and other participatory groups; and (iii) carrying out studies and analyses to improve the frameworks for development in the Mahaweli areas.

The Employment, Investment and Enterprise Development (EIED) Division of the Mahaweli Authority is the MED implementing agency. Technical consultancy is provided by a consortium led by the International Science and Technology Institute, Inc. (ISTI), and including Agroskills, Development Alternatives, Ernst and Young, High Value Horticulture and Sparks Commodities.

PREFACE

Mr K. D. Brandon is a specialist in the production, processing and export of fruits and vegetables.

This manual is based on Mr Brandon's technical consultancy with Ace Processing (Pvt.) Ltd., for the packhouse in Uda Walawe. An earlier edition of the manual has been used by Ace Processing in the startup and operation of the packhouse.

The manual will be of general use to others interested in considering the establishment of a packhouse as an element in a cold chain for the cooling, packing and transport of fruits and vegetables.

CONTENTS

	<u>Page</u>
SECTION A	Introduction 1
SECTION B	Quality Assurance 9
SECTION C	Staff Structures and Responsibilities 26
SECTION D	Packhouse Cleaning Schedules 32
SECTION E	Pesticides and Field Records 39
SECTION F	Quality Assessments and Quality Control 48
SECTION G	Product Packing and Labelling 59
SECTION H	List of Out-Growers 68
SECTION I	Pesticide Maximum Residue Limits (1988) 76
SECTION J	Pesticide Application, Products and Machine Calibration 89



SECTION A : CONTENTS

	<u>Page</u>
Introduction	2
Action Check List	3
Product Movement Chart	6
Packhouse Layout Plan	7

1. INTRODUCTION

This Packhouse Manual is a guide to the correct procedures that have to be adopted in a fruit and vegetable packing operation, if it expects to serve international markets. The standards required today in many of the importing countries have changed completely over the last ten years or so. In particular, in Europe, with both new EEC and individual country legislation, standards have risen to a point where the quality of the product, the way it is packed, and the hygiene standards that have to be adopted, can only be met by a high level of investment in buildings, facilities and staff. In addition crop production standards have to meet stringent safety standards, that make the products safe for the end consumer to eat, which also meet the product specifications set by the market place.

In addition in the United Kingdom, the supermarkets have set even higher standards, which often exceed international regulations, and are generally higher than any other market in Europe. For a packhouse to achieve acceptance, these rigid standards have to be met in full. It must be remembered it is through the supermarket chains that long term potential profits can be made. The supermarkets generally command the highest percentage of market share in Europe. Before a packhouse is accepted as a supplier, a process of "registration" or "approval" has to be completed. Although through the correct investment minimum standards can be met, new packhouses have to realize that supermarket buyers normally have sufficient product on offer to fill their shelves. They always ask the question, WHY another supplier. It is through reliability of product and supply that market share can be gained.

This means that the standards, in their widest sense, have to be as good as and better than existing suppliers, if market share is to be achieved. The packhouse should also have something unique to offer which encourages the supermarket buyer to place an order. There are always some new product opportunities or windows where product is in short supply which encourages a supermarket to set up a new supplier. It is the identification of these products that has to be concentrated on in the first instance. These products then have to be grown economically within an acceptable distance of the packhouse.

Any new supplier if he is going to succeed in the market place, has to "prove" that he is reliable, both in terms of product quality and product volume. This is the first hurdle to overcome when a new market is being developed, the beginning and the end is "reliability". Efforts must be concentrated in this area, setting up a communication system where information flow is effective and rapid, between the market and the packhouse.

The supermarket customers expects to see facilities that come up to their minimum standards; an operation that is well managed with well trained personnel; that all precautions are being taken to safeguard the product for the safety of their customers; that transport facilities are in place that deliver the goods on time and at the right temperature, and that all regulations covering the growing and packing of their products are taken into account at every stage of the production cycle. But in the end it is the consistency of the product, both in terms of volume and quality that matters.

The required "standard" of hygiene of buildings, of safe crop production systems and good infrastructures, are taken for granted as the minimum standards offered by any supplier in any packing operation worldwide. Packhouse standards are always subject to inspection at

any time. On each visit by a supermarket buyer or technical representative, they will carry out an audit of the facilities to make sure everything is in order and in place. These are the basics of any operation, the skill comes in when the orders have to be fulfilled. This is where planning is paramount, including market research, crop planning and sowing schedules to meet marketing needs, product cooling and cold storage, the capacity of the packhouse to pack the required product volume to specification and an efficient cold chain transport system to the market place, is where the company will be judged successful or not.

This manual can only set the required standards as they stand at the time of writing. The speed of change and development means that frequent updates and expansions will be required as time goes on. The manual is designed to make this relatively easy. It is a loose leaf ring folder that can take extra or revised pages without problem. The important point is to keep it updated and give this responsibility to a senior manager. Each section should be self explanatory, and other sections can be added as the need arises.

Each section has its own "Section Letter" and then the section is subdivided by numbered sub-sections, so as to make references to subject matter as easy as possible. This also assists when new and updated insertions are required. It is simpler to renumber and print a section, than the whole manual every time a page is inserted or amended.

The different sections are listed in the index with each section kept as brief as possible. The sections on Quality Assurance, Packhouse Cleaning and Pesticides are longer, and are the most important areas to consider under Quality Assurance. Subjects such as pesticides are very emotive in the final customers minds. Great care has to be taken to ensure all national and international regulations are adhered to rigidly. There can be no exceptions to this rule, as there can be no exception to a clean, hygienic and well managed packhouse.

2. ACTION CHECK LIST

Points to be considered when setting-up and running a vegetable and fruit packhouse.

a) Market Development

Establish products that can be grown economically in the area of the packhouse.

Carry out market research to establish potential markets for the crops that can be grown in the area of the packhouse.

Carry out market research to establish what new crops are required in the markets, and assess if they are viable to grow in the area of the packhouse.

Establish what other new crops can be developed and grown in the area of the packhouse.

Assess the viability of all crop profiles.

b) In the Field

Crop availability to meet orders, along with potential crop quality.

Harvesting, time of harvesting to obtain the best quality, the right maturity and time of day.

Harvesting methods, to reduce picking damage, and picking into suitable containers

Product storage in the field prior to collection.

The harvest to arrival time at the packhouse, and into cold store.

The method of transport from field to packhouse to avoid injury, and the time factor.

c) In the Packhouse

Method of receiving products into the packhouse.

Incoming weighing, quality control and stock control.

Product cooling and storage of raw material at the correct temperature and humidity.

On the Packing Line

- Product sequence from the cold store, first in first out.
- Product identification by grower.
- Grading and packing to market specifications.
- Packaging materials.
- Product return to cold storage after packing.
- Packed product stock control.
- Grower packout percentages.
- Quality control on the packing line.
- Shelf life sampling, both ambient and cold store.
- Packing equipment, eg., scales, knives, etc.
- Consignment preparation and transport to the market.
- Final Quality Control on out-loading.
- Up-dating stock sheets.

d) Cost Control

Field production costs, harvesting and other field overheads.

Transport to the packhouse.

At the Packhouse

Product receipt and Quality Control.
Product cooling and cold storage costs.
Product movement to packing line.
Packing labour.
Packaging materials.
Equipment overheads.
Packing line Quality Control.
Packed product return to cold store and storage costs.
Waste disposal.
Other overhead costs.
Transport to the markets, including exporting cost.
Cost recoveries by Ace processing from Colombo.

e) Hygiene Considerations

Cleaning schedules in the packhouse, daily weekly, monthly, etc.

Staff hygiene standards at the field and at the packhouse.

Cleaning of field containers, vehicles and other equipment used in the field and transport to the packhouse.

Cleanliness of the building, including packing area, cold stores, office, rest room, first aid room, etc.

Cleanliness of the outside areas.

Packhouse equipment, both daily and periodic cleaning and maintenance.

Pest control, and pest control contract.

Storage of cleaning equipment, cleaning materials, and other packhouse equipment.

Packaging materials and storage in clean area outside packing area.

Toilets and all washing areas.

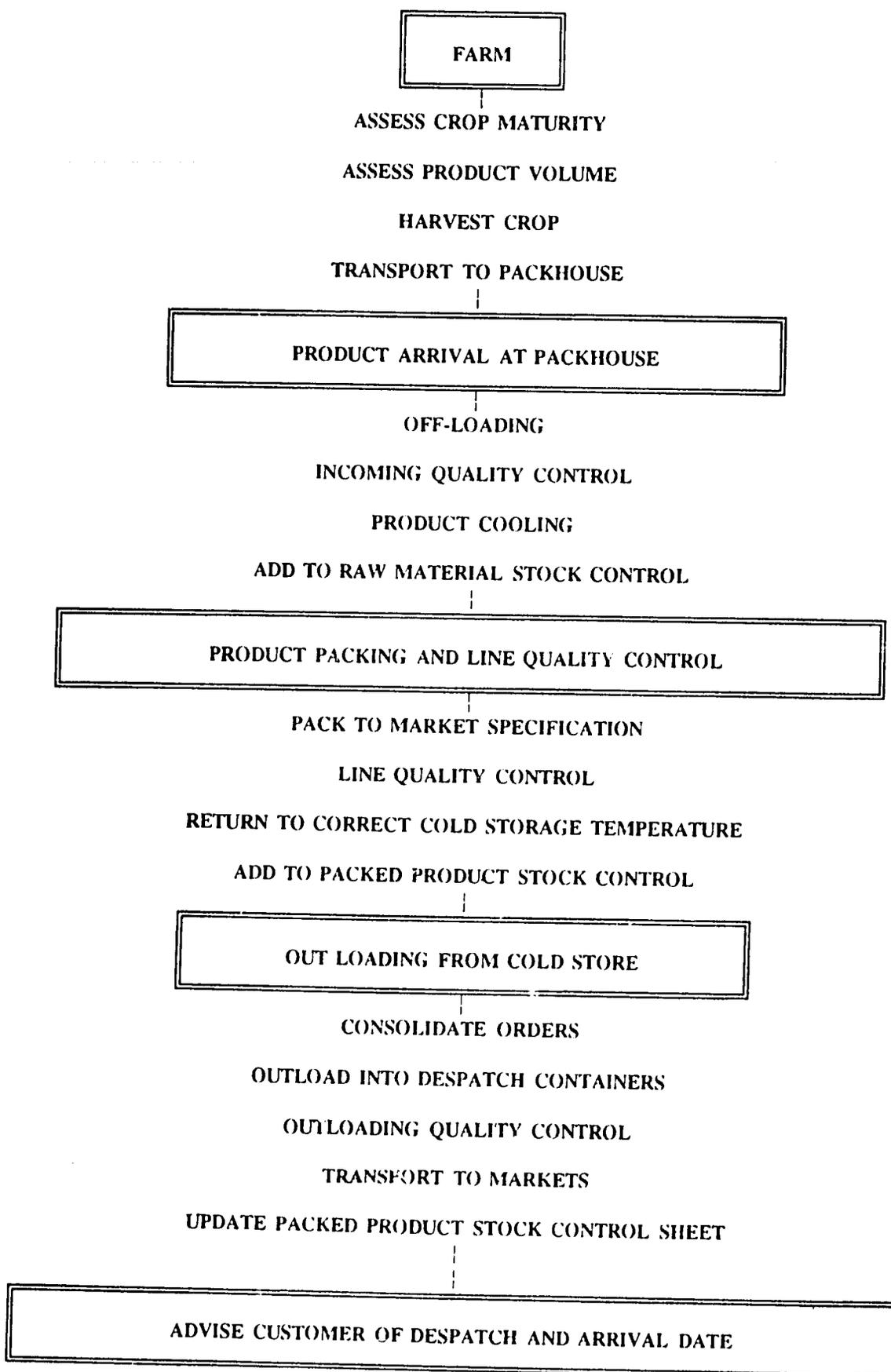
Incoming contamination from boxes, shoes, etc., into the packhouse.

Water quality, which must be potable.

Water drainage from the packhouse and surrounding area.

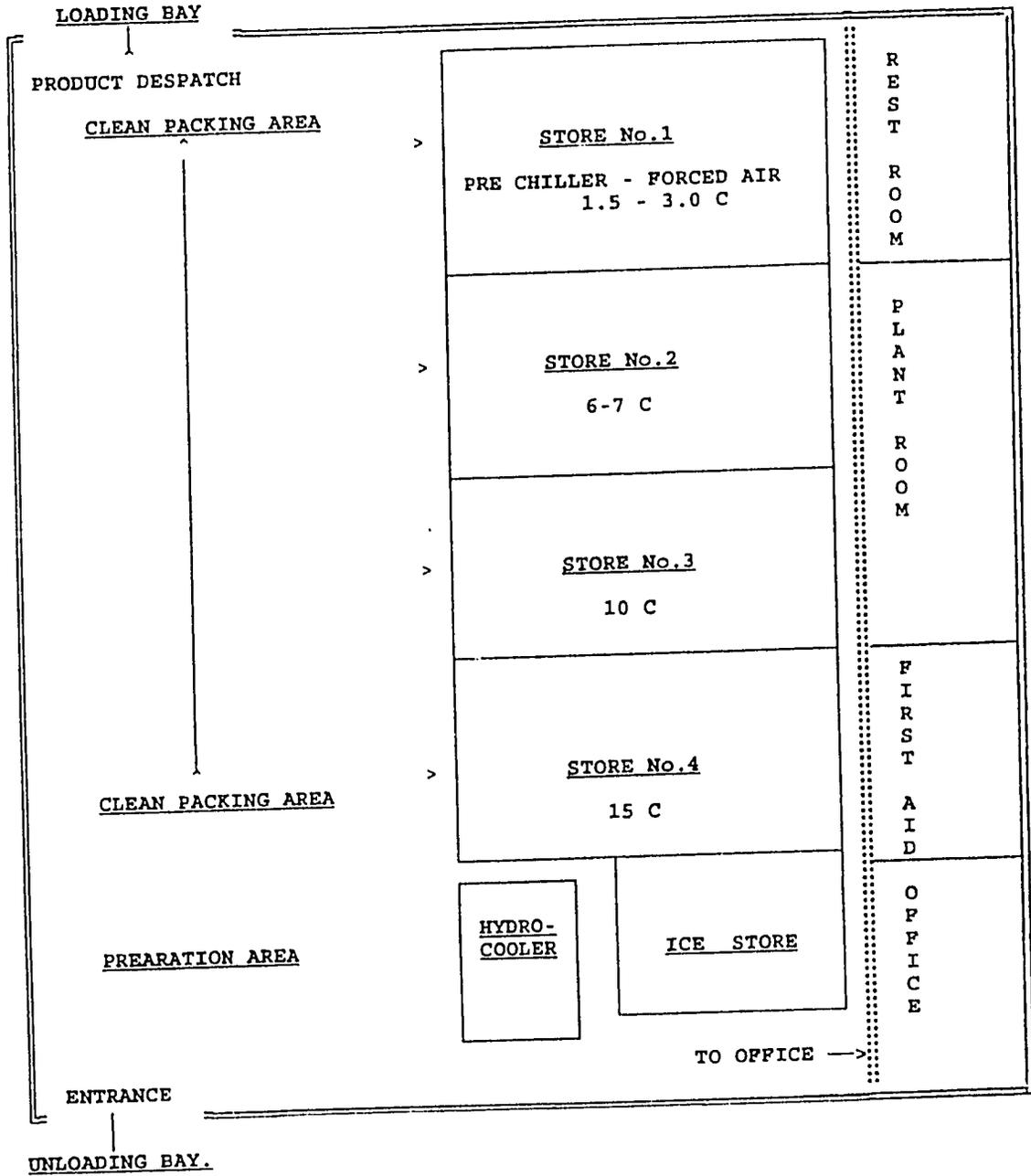
Livestock, which must be kept away from the packhouse area.

PRODUCT MOVEMENT CHART - FIELD TO PACKHOUSE



ACE PROCESSING PACKHOUSE EMBILIPITIYA

PACKHOUSE LAYOUT



NB Not drawn to scale.

SECTION B - QUALITY ASSURANCE

	<u>Page</u>
1. Introduction	10
2. General Packhouse Housekeeping	10
3. Staff	11
4. Water Quality, (Packhouse and Irrigation)	11
4.1 Packhouse	11
4.2 Irrigation water	11
5. Waste Disposal	12
6. Livestock Contamination	12
7. Smoking and Personal Cleanliness	12
7.1 Smoking	12
7.2 Washing of hands	13
8. Pest Control and Pest Control Contract	13
9. Cold Stores and Cold Storage	13
10. Product Handling	14
11. Equipment Calibration	14
12. Health Considerations and First Aid Treatment	15
12.1 Use of plasters	15
12.2 Bandages and other dressings	15
12.3 First aid training	15
13. Staff Training	16
14. Equipment, Materials, Knife Counts	16
14.1 Materials	16
14.2 Knife counts	16
15. Equipment Sterilisation	16
16. Staff Facilities	17
16.1 Food and drink	17
16.2 Personal clothing	17
17. Product Traceability	17

SECTION B - QUALITY ASSURANCE (contd.)

	<u>Page</u>
18. Packaging Materials	17
18.1 Packaging storage	17
18.2 Carton design	18
19. Carton Design	18
19.1 Soaps and towels	18
19.2 Glass and light fittings	18
19.3 Doorways and windows	18
19.4 Eaves and roof ventilation areas	18
19.5 Wood	18
19.6 Conveyors	19
19.7 Equipment repairs	19
19.8 Vehicles	19
19.9 Translations	19
Packhouse Water Quality Record Sheet	20
Irrigation Water Quality Record Sheet	21
Cold Store Temperature Record Sheet	22
Scales Daily Weight Check Sheet	23
Knives and Scissors Daily Count Record Sheet	24
Accident Report Sheet	25

1. INTRODUCTION

The Packhouse Management team is responsible for the ultimate quality and safety of the product that leaves the packhouse. This means that each consignment must meet the Supermarket or market product specifications. Additionally, Management are responsible for product safety. In other words, the final consumer must be able to eat the products packed at the packhouse without any danger to their health, from whatever cause.

This includes a wide area of responsibility, from pesticides, which is covered in detail in the section " F" in this manual, to all other possible contaminants and procedural deficiencies, which can result in a sub-standard product being packed. Product contamination can occur anywhere from the field, to final despatch to the markets. Such items as poor agricultural practices, water quality, both for irrigation and in the packhouse, surface contamination on the product or in the pack, incorrect cold storage conditions, poor packhouse and personal hygiene, animal contamination etc., are all possible sources of product rejection. Every possible cause of contamination which can affect product quality and safety must be identified, along with the precautionary procedures being taken to minimise any risks to the consumer, and these measures must be shown to be working in practice. This Packhouse Quality Assurance Manual is one part of this process of identification and correction of quality problems which can affect products leaving the packhouse.

Cultural practices are also part of the Quality Assurance system, just as much as packing procedures, product cooling, transport and handling operations. At every stage Packhouse Management must be seen to be taking all reasonable precautions against product contamination and poor product safety. The Supermarket Buyers will expect to see in place a written list of identified possible quality problem areas, along with the action being taken by management to eliminate these, as far as it is humanly possible. Product safety must be paramount in the minds of everyone working in the Packhouse, from management to the packhouse cleaning staff.

This is known as taking "**Due Diligence**" which all packhouse supplying the UK have to comply with, as much as any UK packhouse themselves.

The following areas should be addressed during the production, harvesting, cooling packing and transporting, of products from the Ace Processing Packhouse at Embilipitiya.

2. GENERAL PACKHOUSE HOUSEKEEPING

The packhouse must at all times be kept in a clean and tidy condition. There is a separate cleaning schedule under the "cleaning" section in this manual, Section D. All personnel must keep their area of the packhouse clean and tidy throughout the working day. This is much easier in an orderly and well disciplined packhouse. The Packhouse Manager must ensure that this is a matter of routine by all his staff.

3. STAFF

All packhouse staff must be clean and tidy, paying attention to personal hygiene. They should not wear rings or jewelry that may fall off and become lost in a carton or pack of product.

At all times staff must wear protective clothing, consisting of hat that covers the hair, coat that has at least three quarter length sleeves and reaches knee level, and washable shoes. Anyone visiting the packhouse must conform to the same standards. Rubber gloves should be worn when washing and processing wet products.

Signs must be put up at all entrances which clearly state that the packhouse is an area where protective clothing is worn at all times.

If staff arrive in a dirty condition they must either shower and put on clean clothes, or be sent home. As necessary staff should be given instruction in personal hygiene matters. This instruction must extend into the homes of the staff as necessary.

4. WATER QUALITY

4.1 Packhouse

The water used in the packhouse must be of potable quality, both for washing product and hands, and also for Packhouse cleaning. Water samples must be taken regularly and the result recorded and filed. Initially, weekly samples should be taken, and if the water quality is consistently up the standard, (potable water), monthly testing can be carried out. The analytical results must be recorded, and a sample recording sheet is included in this section of the manual, on page 20. This will be inspected by any Supermarket Representative on their visits to the Packhouse.

All water samples must be carried out by a registered laboratory, their name and address must be included in this manual.

4.2 Irrigation Water

Although the risk from contamination from irrigation water is slight, all Supermarket specifications state that this water should also be of **Potable Quality**. Water samples must be taken at regular intervals to establish whether irrigation water meets market requirements.

Each farm or water source must be sampled separately, with the results of the analysis held at the Packhouse. A recording form is included in this section of the Packhouse Manual, on page 21.

5. WASTE DISPOSAL

All waste, whether of vegetable origin or non vegetable, eg. discarded packaging etc., must be removed from the packhouse area on a daily basis. The working areas in the packhouse must be kept clear of debris at all times, and taken to a holding area outside the packhouse and then disposed of well away from the packhouse building. Suitable containers that can easily be washed each day must be used for vegetable waste. eg. plastic bins.

All waste water must be taken well away from the packhouse area, and not allowed to contaminate the water supply to the packhouse, or any other equipment or product in the packhouse.

The dumping of waste materials on a permanent basis near to the packhouse is prohibited. Redundant packaging materials and other burnable waste, can be incinerated well away from the packhouse, at a distance where smoke contamination cannot occur. Vegetable waste can be sold/given to local farmers as stock feed, or composted well away from the building, with a minimum distance of 100 metres. This must not cause a hazard from flies, therefore all vegetable waste should be covered by soil to reduce this problem.

6. LIVESTOCK CONTAMINATION

All livestock are banned from the packhouse and its immediate surrounding area. Suitable fences must be erected to ensure animals are kept at a safe distance from the building. If field crates or boxes are stored outside, these must also be protected from animals.

Harvested crops standing in field crates on the farms can easily be contaminated by animals, and all growers must protect their harvested crops from livestock. The Crop Production Manager must ensure all growers are aware of this situation, and he must regularly monitor the situation along with the Extension Officers. Animals must also be kept out of all crop growing areas.

Where products are delivered to "collection points", these sites must also be safeguarded from animal contamination, and this includes dogs.

7. SMOKING AND PERSONAL CLEANLINESS

7.1 Smoking

This is prohibited in the packhouse at all times. The only area where smoking is allowed is in the Rest/Changing room. No smoking signs must be displayed in all **NO SMOKING** areas, and be easily visible to all staff. In addition, where the written word is used, both English and the local language must be included on the sign.

7.2 Washing of Hands

All staff must wash their hands on arrival at the packhouse before commencing work, each time they return from a break and every time they go to the toilet. Signs to this effect must be put up in the toilets, and above each wash hand basin. During packing staff must be encouraged to wash their hands regularly during packing whenever they become dirty. Only scentless soap can be used with either paper towels or hot air driers.

8. PEST CONTROL AND PEST CONTROL CONTRACT

A Pest Control Contract must be agreed with a recognised pest control company to ensure all vermin are kept under control, and not allowed to contaminate raw materials, packaging and the packed product. This contract must cover the control of rats and mice, flies, cockroaches, ants and termites and any other pest that can affect product quality and cleanliness, both inside the Packhouse and its immediate surrounding area.

The contract must be managed in such a way that regular visits by the contractor ensures that full control of vermin is maintained at all times. The frequency of visits must be stated in the pest control contract. Currently the following company has been contracted to Ace Processing to carry out this work:

Finlay Rentokil (Ceylon) Ltd.

Finlay House,

P.O.Box 211,

186, Vauxhall Street,

Colombo 2.

Sri Lanka. Tel: 01 449308

Fax: 01 448216

Copies of the Pest Control Contract must be kept separately from the Packhouse Manual, along with the inspection records completed by the Finlay Representative each time a visit is made. The Supermarket Buyers will ask to see these records whenever visiting the Packhouse on their regular inspections.

9. COLD STORES AND COLD STORAGE

The cold stores must be kept in a clean condition, and free from mould and bacterial growth at all times. The correct product packing cycle must be maintained, to make sure that produce is packed according to the harvest date. Incorrect cycling will result in quicker product deterioration after packing. All incoming produce must be marked with its date of receipt, and added to the stock control sheet before being placed in the pre-cooler. The stock control sheet must also include the grower number as part of product traceability.

The cold stores must be run at their correct temperatures for the products in store, see section G pages 63 and 64 for further details. Daily temperature readings must be taken and recorded on the recording sheet. (sample copy included at the end of this section, page 22).

The maintenance of correct product temperature is essential to give maximum product life. All products must be cooled to their correct temperature as soon as possible after harvesting. The removal of field heat is the most important factor in extending product shelf life. Individual product specifications, as well as the product temperature guide pages 65 and 66 in section G, give further details on the correct cooling and storage temperatures for the different products packed for export. Section G, page 67 illustrates a sample specification sheet.

10. PRODUCT HANDLING

Fruits and vegetables must be kept free from any form of contamination from harvesting to final picking. In the field produce must be placed into **clean plastic field crates**, these then must be stored in a clean shaded area before being transported to the collecting points. During all field to packhouse transport operations, refrigerated vehicles should be used. These not only help stabilise product temperatures, but also stop dust and insect contamination during transportation, as they are fully enclosed.

The collecting points must be situated away from dusty environments and should have shading to stop direct sunlight falling on the produce.

At the Packhouse, the full plastic crates, after the incoming Q.C. procedure has been completed, must be placed into the correct cooling temperature to take out the field heat. Do not place products that are sensitive to cold air in a cold store that is too cold, see Section G pages 65 and 66. To assist in the cooling process, fans should be installed in each cold room to speed up the cooling process. Never store a product in the wrong cold store for any length of time, otherwise surface damage will occur. The product can be packed as soon as the correct field heat has been removed, then place the product into the appropriate cold store for final cooling.

Always ensure the humidity levels are correct for the product in question. Dehydration can be a serious problem during cold storage. See separate list of temperatures and humidities for products packed in the Ace Processing Packhouse, Section G, pages 63 and 64.

During packing only remove produce from the cold store as it is required, and always return to the appropriate store as quickly as possible following packing. During out-loading load directly from the cold store into the refrigerated vehicle. Do not leave packed produce standing around to gain temperature.

11. EQUIPMENT CALIBRATION

It is an offense to sell produce that is incorrectly weighed. When packing, a "tare" weight is always added to the weight of a box or pre-pack. The tare weight consists of the weight of all packaging and the estimated weight loss of the product during shipment. See Section G page 66, for Dubai example of net weight and tare weight which gives gross weight of carton.

All scales must be checked for accuracy each day, this should be done before packing commences in the morning by the Q.C. Staff. An appropriate set of "check weights" must be available for this. These must have the stamp of the local Weights and Measures Authority to confirm their accuracy. A daily recording sheet must be maintained to show that this has been completed. Copy of a recording sheet can be found on Page 23 in this section of the Q.A. Manual.

All other measuring equipment must from time to time be checked for accuracy, eg refractometers etc.

12. HEALTH CONSIDERATIONS AND FIRST AID TREATMENT

Packing and handling staff cannot handle products in the packhouse when they are ill and when there is a risk of contaminating the product being packed or their fellow workers. They can only do so when there is no risk of passing infections on to other third parties. In addition when a worker is injured and has to receive medical treatment, this has to be recorded in an accident book. See page 25 in this section of the Q.A. Manual for a copy of an Accident Report Sheet.

12.1 Use of Plasters

Where a member of the packing staff receives injuries requiring treatment, the only elasto plasters allowed are the metal detectable type. Each time a plaster is issued, a record in an accident book has to be completed giving the number of plasters issued and to whom. The nature of the injury must also be recorded. At the end of the day or packing shift, all plasters must be accounted for. Workers who come to work with plasters already in place, must have these changed to metal detectable type and an entry made in the accident book that these have been issued.

12.2 Bandages and Other Dressings

Packing staff must not wear any form of bandage or other wound dressing during packing on their hands or any other exposed part of their bodies. If these cannot be replaced with metal detectable plasters, the worker must either be sent home, or given work where there is no risk of contaminating the produce at any location in the packhouse.

12.3 First Aid Training

At least one person in the Packhouse must have **some recognised first aid training**. A suitable First Aid kit must be readily available in the packhouse. This must comply with any local bye-laws for a packhouse of this size, along with any other provisions contained in the bye-law concerning health and safety.

13. STAFF TRAINING

All staff must receive adequate training in the work they do. This has to cover:

- Market information, including specifications
- Packaging requirements
- Packing procedures
- Product knowledge
- Packhouse hygiene
- Personal Hygiene
- Product cooling and maintenance of product temperatures
- Record keeping
- Use of equipment, including calibration

All instructions must be given either in English or the local language, whichever is appropriate. The Packhouse Manager is responsible for staff training. Training should be both on the job training and off the job training, whichever is appropriate.

14. EQUIPMENT

14.1 Materials

ALL KNIVES, TABLE TOPS AND OTHER CUTTING SURFACES MUST BE MADE FROM STAINLESS STEEL. ALL KNIVES MUST HAVE PLASTIC HANDLES. Wood is not allowed in the packhouse except for pallets.

14.2 Knife Counts

At the beginning of each shift where knives are being used, these must be counted as they are issued to the packing staff. This procedure must be repeated at the end of the shift, and a record kept of the number of knives returned against the number issued. If there is a discrepancy in the numbers, the missing knife/s must be located before any product can be despatched. See page 24. This also applies to scissors if these are used in the packing process.

15. EQUIPMENT STERILISATION

All knives, scissors etc. must be sterilized during the working day and at the end of each day. Where knives are constantly being used, each worker should be issued with two stainless steel knives, one should be immersed in a solution of Hypochlorite at a strength of 100ppm of available Chlorine, and interchanged at frequent intervals during the working day. All other equipment used in cutting fruits or vegetables must be treated in a similar way. See also Section D, page 37 for more information.

16. STAFF FACILITIES

16.1 Food and Drink

The eating of food and consumption of drinks are prohibited in the packhouse. A separate staff room outside the packing area should be set aside for this purpose. Notices must be displayed in the packing area and cold stores to this effect. Anyone found eating or drinking will after one warning, be subject to dismissal from their work.

16.2 Personal Clothing

All outside clothing, eg coats, hats, shoes, etc. must be changed in the staff room and not in the packhouse. If staff have to walk outside to gain entry into the packing area, their outside shoes should be left at the staff entrance, where their packhouse shoes are put on. All staff should be provided with a locker to keep their personal items in a safe place.

17. PRODUCT TRACEABILITY

This is an important area, the Supermarket customers will expect to see a system of product "traceability", which gives the grower code number on each carton of produce. In addition to the grower reference number, the actual date of packing should also be marked on to the carton. Each grower should therefore be issued with a "Grower Number". The grower must always place a card/plastic label either in the Field Crate, or attached to the outside of it, giving his code number. The date of harvesting and delivery into the packhouse should always be recorded at the packhouse on the incoming Q.C. sheet, and then included on the raw material stock control sheet.

When product is taken from the cold store for packing, the grower number must be transferred onto the packed carton, along with the date of packing. Where more than one growers product is packed into one carton, then each grower number must be included on the end of the box for reference.

This procedure is important, so that when problems in quality occur, these can be referred back to a particular grower or growers, along with the packing date. This makes identification and correcting quality problems easier, assisting in the management of the packing operation.

18. PACKAGING MATERIALS

18.1 Packaging Storage

All packaging materials must be kept outside the packing area, preferably in a separate room or building. This must be clean and water tight and allow good rotation of packaging. The Packhouse Pest Control Contract must also cover this area, as contaminated packaging from whatsoever source, cannot be used.

Plastic bags and liners should be kept in dust proof containers. Only sufficient packaging should be taken into the Packhouse for the day/s or shift production needs. See also Section G, page 60.

The packaging store must be kept clean at all times, see cleaning schedule, Section D, page 37.

18.2 Carton Design

All cartons must be designed with the correct strength and water resistance to ensure good travelling capabilities. Waterproof glues or approved wax coating, made from vegetable waxes, should be used for all products exported to reduce damage risk to the packed produce from carton collapse. The use of waxes or waterproof glues also helps to reduce produce dehydration during transport. All cartons must be correctly labelled. See Section G Page 60.

19. OTHER IMPORTANT POINTS

19.1 Soaps and Towels

All soap used in the packhouse must be liquid scentless soap. Plastic receptacles must be placed near to the wash hand basins for used paper towels, if these are used. All waste bins must be emptied at least once per day, more frequently if they are full.

The use of hot air dryers is also permitted, with sufficient numbers placed near to the wash basins giving easy access after washing hands. Ordinary towels are not allowed in the packhouse, as these are a source of bacterial contamination on to the products, even if washed frequently.

19.2 Glass and Light Fittings

There must be no glass in the packhouse, except for light bulbs. All lights must be covered with a sleeve to avoid glass contamination in the packed product, if a light should break during packing.

19.3 Doorways and Windows

All doorways must be protected with plastic strip curtains or plastic sealing doors. The use of air curtains are also allowed. All windows must have fly screens in place at all times.

19.4 Eaves and Roof Ventilation Areas

All openings must be screened against both flies and birds.

19.5 Wood

Wood in any form is prohibited in the packing area and cold stores, except wooden pallets which are allowed for product handling. Great care must be taken not to damage or contaminate packed products with wood splinters from these pallets.

19.6 Conveyors

Where conveyors are used, these must have belts fitted that are of food grade quality.

19.7 Equipment Repairs

When equipment is being repaired, all tools, spare parts, oil and grease etc., must not contaminate stored produce for packing, produce on the packing line, packed product or any equipment used in the packhouse. Bolts, nuts, screws along with any other small items used in repairs must be kept in a safe container during repairs. During more emergency repairs during packing, packing may have to cease while the repairs are being made, especially if there is any risk of contamination of the packed product.

19.8 Vehicles

All vehicles used to carry both raw material and packed produce must be kept in a clean condition. If a vehicle has been used to carry any substance likely to taint the finished product, this vehicle must not be used until all risks of taint have been eliminated.

19.9 Translations

All instructions must be given in a language that can be understood by the staff, even if this means duplication of instructions etc..

**PACKHOUSE
WATER QUALITY RECORD SHEET**

Sheet No. WQ1

DATE	CODE NUMBER	SAMPLING POINT	LABORATORY USED	RESULT OF ANALYSIS

NB. Always keep the original copy of the laboratory analysis result sheet. Insert the code number from this sheet on to the laboratory results sheet for future reference.

All water must be of Potable quality.

SECTION C - STAFF STRUCTURES AND RESPONSIBILITIES

Page

1.	Staff Reporting Structures	27
2.	Responsibilities and Job Descriptions	28
2.1	General Manager	28
2.2	Project Manager	28
2.3	Packhouse Manager	28
2.4	Quality Control Manager	29
2.5	Quality Control Officer	30
2.6	Assistant Packhouse Manager	30
2.7	Line Supervisors	31
2.8	Packers and Cleaning Staff	31
3.	Field Staff	31

PACKHOUSE STAFFING SCHEDULE

1. STAFF STRUCTURES

GENERAL MANAGER

PACKHOUSE CONSULTANT

PROJECT MANAGER

PACKHOUSE MANAGER

CROP PRODUCTION MANAGER

EXTENSION OFFICERS

ASSISTANT MANAGER

QUALITY CONTROL MANAGER

LINE SUPERVISORS

Q.C. OFFICER

PACKING STAFF

OFFICE STAFF

CLEANING AND MAINTENANCE STAFF

2. RESPONSIBILITIES AND JOB DESCRIPTIONS

2.1 General Manager

The General Manager has overall responsibility for both the profitability and efficient organisation of the packhouse. This person has to ensure that the necessary finances are available to fund both capital and operational expenses, which allows the packhouse to procure, pack and market products that meet the needs of the markets being served, both in volume and quality.

2.2 Project Manager

- Responsible to Aitken Spence General Manager in all matters concerning the running and operation of the packhouse.
- Responsible for coordinating customer orders and requests, and for passing this information down to the Packhouse Manager for action.
- He is responsible for the completion of all documentation relating to the sale and export of the produce.
- He is responsible for all capital expenditure proposals to Aitken Spence, budgets and packhouse profitability.
- He has to agree crop planting schedules with the Production Manager. He should meet with the field staff at regular intervals to ensure cropping programmes are being met. If there are crop problems which could result in deficiencies in output from the packhouse this must be reported immediately to the customer in question.
- He has to ensure all packaging and other consumable items are purchased to meet packhouse output and customer demands.
- He is responsible for identifying training needs of staff, with the Packhouse Manager.
- He is responsible to make sure that the packhouse is a safe place in which to work.
- He is ultimately responsible for the smooth running of the packhouse and its efficiency.

2.3 Packhouse Manager

- The Packhouse Manager has to operate an efficient, smooth running business, where economic outputs are achieved, and for good staff relations.
- He has to make sure all staff wear the correct protective clothing whenever in the building, and provide visitors with coats and hats.

- He must ensure all staff are clean and that hygiene standards both of staff and the building are at a high level.
- He is responsible to make sure at least one member of the staff is trained in first aid.
- He is ultimately responsible for the maintenance of all packhouse records, whether physical or financial. Records must be kept up to date and readily available for Senior Management inspection.
- He must make sure all staff are equipped to carry out their duties, and liaise with the Project Manager on all points concerning efficiency and profitability.
- He must oversee that all cleaning schedules are maintained at all times, paying attention to both inside the building and the surrounding areas.
- He is responsible for staff discipline and for an orderly packhouse operation.
- He is overall responsible for staff training.
- He must ensure the no smoking ban is enforced in the packhouse, and that all food is consumed outside the packing area.

2.4 **Quality Control Manager**

- The Q.C. Manager is responsible for the quality of the final product leaving the packhouse, and is therefore the key person to ensure all specifications are met. If product is below specification, then it is the responsibility of the Q.C. Manager to stop packing.
- No one should over rule his decisions on product quality, and packing should only proceed when written agreement from the customer has been received, stating that a change to the specification can be made. This can be done by Fax.
- He is responsible for all Q.C. checks. This includes incoming product, on the packing line and the final Q.C. when product leaves the packhouse.
- He is responsible to make sure all Q.C. equipment is in good working order, and maintained and cleaned as appropriate.
- He is responsible for ensuring water samples are taken regularly from the water supply in the packhouse, and that they come to the required minimum standard. (Potable Water)
- He is responsible for co-ordinating the pesticide residue testing schedule, that residue samples are taken at regular intervals, and that the field record sheets are maintained.

- Along with the Packhouse Manager, he is responsible to make sure the packhouse is clean and tidy at all times.
- He is responsible to make sure all crop specifications are kept up to date, and that line staff have current copies available when they are packing. Final responsibility for correct packing lies with the Q.C. Manager.
- He must make sure all hygiene regulations are followed, this includes the sterilization of equipment as necessary, eg. knives, cutting boards, etc.
- He is responsible for taking, keeping and recording all "shelf life tests." Both cold stored and ambient tests will be required on all export products.
- He must check at regular intervals the temperatures of the cold stores and the products within them. Any deviation must be reported to the Packhouse Manager immediately, and corrective measures taken.

2.5 Quality Control Officer

- At all times this person has to deputise for the Q.C. Manager. He has a specific responsibility to ensure that harvested crops are to specification at the time of harvesting, in conjunction with the Extension Officer. He must be given the authority to reject crops at source, reporting this fact to both the Packhouse Manager and to the Field Production Manager.
- He will accompany the collecting vehicle to the pick-up points, and if product is below specification he will reject it before loading on to the vehicle, reporting the fact to the grower immediately.

2.6 Assistant Packhouse Manager

- He generally assists both the Packhouse Manager and the Quality Control Manager as necessary, and duplicating for either in their absence.
- He must make sure there is sufficient crop on the lines for packing, any shortfall of stocks must be reported to the Packhouse Manager immediately.
- He must check the packing lines throughout the day, advise line supervisors and packing staff, in conjunction with the Q.C. Manager, on correct packing procedures. He must keep up to date all stock sheets, both raw material and packed product.
- He must make sure all cleaning schedules are maintained, and that the areas around the packing tables are kept clear of debris at all times.
- He must make sure that the packed product is moved back into the correct cold store immediately after packing. In addition the Assistant Packhouse Manager must ensure all raw material is returned to cold storage before staff

leave their work places at break times and at the end of the day.

- He must keep a knife count before and after work, and that other items are accounted for at the end of each working session.

2.7 Line Supervisors

- They must constantly check the produce being packed, that it meets the specification, and motivate the staff to attain high standards of work.
- They are responsible for training their staff in packing techniques.
- They must ensure all their staff are correctly dressed, that they are clean and fully fit to carry out their packing tasks without the likelihood of contaminating the product. If staff are ill they must be immediately sent home.

2.8 Packers and Cleaning Staff

There is no specific job description for these staff, their responsibility is to carry out instructions given to them by Packhouse Management staff concerning the cleanliness of the Packhouse. They must wear clean coats, hats and shoes. As necessary all staff must be given instructions on personal cleanliness. If any member of staff persistently disobeys these instructions, they should be dismissed.

3. FIELD STAFF

The Field Production Manager is responsible for all crop production, with the assistance of the Extension Officers. Crop production requirements will be scheduled in advance by the Project Manager, who must give both crop quantities and quality required to meet marketing objectives.

SECTION D - PACKHOUSE CLEANING SCHEDULES

Page

1. Introduction	33
2. Responsibilities	33
3. Cleaning Materials	33
3.1 Cloths	33
3.2 Brushes	33
3.3 Mops and Buckets	33
3.4 Cleaning Disinfectants	34
3.5 Storage of Disinfectants, Detergents and Equipment	34
4. Cleaning	34
4.1 Inside Packhouse	34
4.2 Outside Areas	36
Summary Chart of Packhouse Cleaning	37

1. INTRODUCTION

It is essential to keep both the inside areas of the packhouse and the outside area of the building, in a clean and tidy condition at all times. Never leave cleaning until later, it should become a natural part of normal working practice for all staff to automatically keep their work areas free from debris. It will require encouragement and persuasion in the first place. It is the responsibility of the Packhouse Manager to instil in all his staff the need for cleanliness at all times. This is not only mandatory as far as the UK and EC Supermarkets are concerned, it is also a discipline which reflects the packhouse efficiency and management control.

2. RESPONSIBILITIES

The Packhouse Manager is ultimately responsible for the running of the Packhouse, and therefore its cleanliness. Dedicated staff have to be appointed whose sole responsibility is to keep the packhouse clean throughout the working day. The person/s who have this responsibility must ensure that the work areas are kept clear of waste materials, both vegetable and non vegetable, at all times, and that the full cleaning schedule is completed at the end of every working day. In addition other cleaning schedules are completed at their correct time. See cleaning schedule summary on page 5 in this section of the Manual.

3. CLEANING MATERIALS

Only authorised cleaning equipment and materials may be used, these must be kept hygienically clean themselves, and when not in use kept as dry as possible, in a storage area outside the packing area. A separate cupboard should be provided.

3.1 Cloths

All cleaning cloths used must not shred, or leave any waste deposit on the surface being cleaned. After use cloths should be thoroughly washed clean, and at regular intervals they must be either boiled or sterilized. Any worn, damaged or contaminated cloth must be replaced. Disposable cloths are recommended which are made from synthetic materials.

3.2 Brushes

The most suitable type of brush is made from Polypropylene or high density nylon. These can easily be sterilised by either boiling or in a caustic water solution. Brushes made from bristle or other plant material should be avoided if at all possible.

3.3 Mops and Buckets

Mops are a source of bacterial infection unless they are correctly sterilized, and only mops with removable heads should be used. All handles should be of plastic rather than wood. All buckets must be made from high density nylon or polypropylene. These should have steel handles. Squeegees should be made from rubber, with the rubber cleaning pad replaced when worn.

3.4 Cleaning Disinfectants

Regular sterilisation of equipment is necessary to kill micro organisms, detergents remove some harmful organisms, but these materials do not kill all harmful organisms. The following disinfectants can be used on table and other surfaces in the packhouse to reduce cross infection with the packed produce.

Hypochlorite: These are strong oxidising agents, and are the most suitable for food packhouses. Sodium Hypochlorite, eg Milton, is the most common type, and can be used at a strength of 100ppm of available chlorine.

Ammonium Compounds, QAC's: These are very safe to use in the packhouse, they are odour free, non-corrosive and taint free, but they have a narrower range of activity than the chlorine compounds. Their activity is low where crop residues on work surfaces are a problem.

Iodine Based Compounds: These kill a wide range of bacteria at both high and low temperature, but they can cause taints, they are corrosive and can cause staining. They should only be used under exceptional circumstances.

3.5 Storage of Disinfectants, Detergents and Equipment

Both cleaning chemicals and cleaning equipment must be stored outside the packing area. A separate room or cupboard should be provided which can be kept locked when the materials are not being used. A record of all materials purchased must be maintained, and this must include a physical count of brushes, clothes etc. each day. All chemicals must be stored in unbreakable containers and their dilution rates should be clearly marked on either the container or on a separate instruction for use chart displayed where it can easily be seen.

4. CLEANING

The following check list should be used as the basis for a regular cleaning schedule in and around the packhouse:

4.1 Inside The Packhouse

- Brush and wash the packhouse floor every evening when work finishes. Do not leave until the morning.
- Wash all tables with clean water every time packing finishes. This includes all those times during the day when packing finishes stops for breaks etc. Clean table surfaces once per day with a hypochlorite solution.
- Wash all utensils that have been used during preparation and packing of products. Knives and all cutting boards and surfaces should be washed in a sterilising solution, eg hypochlorite at 100ppm of chlorine.

- Sweep and wash out the cold stores as far as is practical with product stored inside. Once a week all product should be moved and a thorough cleaning completed.
- Sweep around the back and sides of the cold store every day. Wash this area at least once a week.
- Clean all exposed surfaces of the cold rooms at least once per week, more often if they become dirty.
- Clean the window ledges every day, and the window glass once per week, more often if they become dirty.
- Clean the water drains every day, removing the grills and removing all solid debris from the waste container in the drain. Wash these thoroughly in clean water.
- Wash the water drainage channel in the packhouse at the end of every day, and at least once per week clean the channel with a strong hypochlorite solution to kill any bacteria and mould growth.
- Clean the office every day.
- Clean the first aid room, rest room and plant room every day. Brush floors and wipe all surfaces with clean water.
- Empty and clean hydrocooler every time it is used, and cover to protect from flies and dirt.
- Empty all waste containers every evening, or when they are full during the day, this including waste paper baskets in the office. See also Section B page 2, No.5.
- Clean all hand basins at the end of the day, and during the day if they become soiled, using a scentless cleaner.
- Clean the light fittings in the packhouse once a week, taking out the plastic covers to remove dead flies etc.
- Wash the lower part of the packhouse wall at least once per week, and more often if they become dirty during packing.
- Clean the top of the cold stores once per month.
- Clean the roof beams every 3 months.

- **Other Fixed Equipment:** Ensure all plant and machinery is kept clean at all times, remove dust and other contamination which easily occurs around electric motors, conveyors etc, daily. All fixed equipment must be cleaned thoroughly at least once per week, or more often if it becomes dirty. Parts that come into contact with produce, eg conveyor belts, should be washed daily, wash with a hypochlorite solution once per week.

4.2 Outside The Packhouse

- Clean the toilets every day, using a caustic or hypochlorite toilet cleaner, and wash the floor areas. Clean the hand basins with a cleaner every day.
- Clean the packaging store every day.
- Brush the pathway around the building every day, and collect up any litter within the packhouse surrounding area.
- Ensure all exterior painted surfaces are cleaned regularly, eg doors, window sills and lower surfaces of the walls.
- Gutters and Roof Areas: Clean these areas every six months, or sooner if they become contaminated before this time. During rainy periods make sure the gutters are always clear to reduce water overflow problems.

PACKHOUSE CLEANING SCHEDULES

CLEANING AREA	FREQUENCY	METHOD	MATERIALS
1. INSIDE AREAS			
Floor	Daily	Brush/Wash	Clean Water
Work Surfaces	Daily	Wipe/Sterilise	Hypochlorite
Knives	Daily	Wash/Sterilise	Hypochlorite
Cold Stores	Daily	Brush & Wash	Clean Water
" "	Weekly	Wash Walls etc	Detergent/Water
" "	Weekly	Clean Roof	Brush/Wash
" "	Weekly	Wash Exterior	detergent/Water
Windows	Daily	Wash Ledges	Clean Water
"	Weekly	Clean Glass	Clean Water
Drains	Daily	Wash/Brush	Hypochlorite
Waste Bins	Daily	Wash/Sterilise	Hypochlorite
Hand Basins	Daily	Wash	Cleaner/Water
Toilets	Daily	Wash/Brush	Hypochlorite
Office	Daily	Brush/Wash	Clean Water
First Aid Room	Daily	Brush/Wash	Clean Water
Light Fittings	Weekly	Wash	Clean Water
Packhouse Walls	Weekly	Wash	Detergent/Water
Roof Beams, etc.	Monthly	Wipe	Clean Water
Fixed Equipment	Daily/Weekly	Wash/Wipe	Hypochlorite
Strip Curtains	Weekly	Wipe	Clean Water
Doors	Weekly	Wipe	Clean Water
Insectocutors	Daily	Brush/Wipe	Clean Water
Conveyor Belts	Daily	Wash/Wipe dry	Hypochlorite
Packaging Store	Daily	Brush	Dry Brush
Hydrocooler	When Used	Wash out	Clean Water
2. OUTSIDE AREAS			
	Daily	Brush/Wash	Clean Water
External Paths	Monthly	Brush/Wash	Clean Water
External Walls	Monthly	Wash	Clean Water
Other Painting	6 Monthly	Brush Out	Clean Water
Gutters/Roof	Daily	Clean Area	Clear Rubbish

NB Hypochlorite: See page 2 for dilution rates with water.

PACKHOUSE CLEANING SCHEDULES

(Additional Items To Be Specified)

CLEANING AREA	FREQUENCY	METHOD	MATERIALS

Complete as necessary

SECTION E - PESTICIDES AND FIELD RECORDS

	<u>Page</u>
1. Introduction	40
2. Maximum Residue Limits	40
3. Harvest Intervals	41
4. Label Recommendations	41
5. Pesticide Application	42
6. Equipment and Personnel	42
7. Pesticide Storage	43
8. Banned and Restricted Pesticides	43
8.1 Banned Pesticide List (February 1994)	43
8.2 Restricted Pesticides	44
8.3 Safety	44
9. Field Records of Pesticide Application	45
Field Record Sheet for Fertilizers and Pesticides	46

1. INTRODUCTION

All suppliers of produce to the UK or any other EEC country, have to conform to the regulation concerning the use and application of pesticides in the importing country. When a product is sold it must not contain residues of pesticide above legal limits set by a) the UK, b) EEC and c) Codex. Not all fruits and vegetables or pesticides have legal maximum residue limits, but all crops are subject to pesticide application to harvest intervals. These are known as *minimum harvest intervals*. In other words, if a crop is harvested for human consumption the required number of days must elapse before the crop is harvested. This requirement applies to crops which have been sprayed with pesticides where there are maximum residue limits in force, as well as crops where none are currently specified, even if the M.R.L. is within legal limits. It must be noted that where there is a maximum residue limit and the crop is harvested before the time limit has expired, it is an offense to sell that crop.

It is the responsibility of the supplier of the produce to ensure that these regulations are adhered to completely at all times. *Failure to do so will result in losing business, as the supermarkets will stop taking produce from any supplier who sells products that do not conform to these regulations.* Legal action can also be taken against the exporter.

It is up to Packhouse Management to ensure these regulations are adhered to and that all necessary records are kept concerning pesticides application at the packhouse. The Supermarket representative will inspect pesticide records when visiting a supplier. The main points that the supplier must be concerned with are as follows.

2. MAXIMUM RESIDUE LIMITS

A maximum residue limit is determined by laboratory analysis, and has to be carried out by a recognised pesticide residue testing laboratory. Today the level of pesticide residue that can be detected in fruits and vegetables is very small and this can only be done by specialist equipment. Residues are sometimes set at the limits of detection, therefore mistakes cannot be made.

It is the responsibility of the supplier of the product to ensure that the produce that he sells conforms to the standards set by Governments and International Organisations. It is therefore essential that each supplier of produce ensures that his products comply with all the regulations concerning residues. This can only be done by,

- a) Monitoring pesticide use on the farm making sure that pesticide application records are maintained. See the copy of the Field Record Sheet on pages 7 and 8 in his section.
- b) Ensuring that only pesticides that are approved for the crop in question are used.
- c) That no banned pesticides are used.
- d) That the correct interval between application and harvesting is maintained.

- e) That pesticide residue analysis is carried out on a routine basis by an approved laboratory. This will be carried out by the customer and they will expect to see records of residue sampling by the supplier. This is known as taking *due diligence* that a product supplied is safe for the final customer to eat.

3. HARVEST INTERVALS

All pesticides have a spray to harvest interval. This may be as long as several weeks to only one day or less. Spray programmes must be designed with this in mind, and as crops near their harvest date, short harvest interval pesticides can only be applied. If a suitable pesticide with the correct spray to harvest interval is unavailable near to harvest to control a particular problem, *then no pesticide can be applied*, This may mean that a crop cannot be sold because of a pest or disease problem, as it will be out of customer specification.

Each pesticide container should have the harvest interval printed on the label, this is usually in days from the day of spraying. If this is not present on the label, do not use the pesticide until this information is known. Failure to do so may result in an illegal fruit or vegetable being sold.

The law states that the supplier must take all reasonable precautions to safeguard the products sold into the market place. If a residue is found *above* a legal limit; or a residue of a pesticide that is not *recommended* for the crop being sampled; or a pesticide is detected that is in a *banned* list of pesticides, then *the supplier is liable*. Legal proceedings can be taken against the supplier, and the supplier will lose orders with the customer who has taken the sample.

4. LABEL RECOMMENDATION

EEC law states that only pesticides that have a *label* recommendation can be applied to a crop. In other words the label container of the pesticide must state the target crop or crops which can be sprayed, along with the target pests or diseases to be controlled. If this information is not contained on the label **DO NOT USE UNTIL CLEARANCE HAS BEEN OBTAINED**. The following points must be borne in mind:

- a) Only pesticides that have clearance in the country of application should be used. Most countries have Government lists of approved pesticides.
- b) Use only according to the label recommendation.
- c) A pesticides can only be used if it is **NOT BANNED**, either in the importing country or on another international list, eg Codex, even if there are no specific restrictions in its use in the country where it can be purchased.
- d) Some buying organisations, eg UK Supermarkets, have their own list of additional banned pesticides, although they are not on any international list.

- e) If there is no written information concerning the use of a particular pesticide on a target pest or crop, do not use it without receiving written permission from the importer or customer.

5. PESTICIDE APPLICATION

Pesticides must be applied according to the manufacturers instruction, they must never be applied at a higher concentration than that recommended on the label, or more frequently than stated in the written instructions by the manufacturer. In addition, the dilution rate in water which is recommended by the maker of the pesticide, must be adhered to at all times. Any deviation from these practices can lead to residues in the subsequent crop being greater than permitted. This is even if the total amount of pesticide that can be legally applied to a crop during its growing period, has not been exceeded.

Remember:

1. Use minimal pesticides whenever possible, in other words only spray if it is necessary for the health of the crop and to keep the crop within the market specification.
2. Do not mix different pesticides unless there are clear instructions to do so. Not only can this be harmful to the crop being sprayed, but it can affect the residue levels.
3. The use of adjuvants can lead to enhanced activity of pesticides. Sometimes a reduction in the overall quantity of "active ingredient" normally applied can be made where these are used. Only use an adjuvant if there is a written instruction that it is safe to do so.
4. Always avoid pesticide residues on the surface of the crop. Choose pesticides, as far as it is possible, that leave little or no surface residues. All UK Supermarket *will reject* a product if it has evidence of surface pesticide residues, even if the residue is safe for the customer to eat, and the product is washed or cooked before eating.

6. EQUIPMENT AND PERSONNEL

Pesticide application equipment must be kept in good working condition, this means replacing nozzles frequently and ensuring the spray pressure is within the manufacturers specification. Ensure filters etc. are cleaned regularly and after each use the spraying equipment must be thoroughly washed out. Residues of old sprays in a sprayer can lead to crop rejection by the supermarkets. These can show up in pesticide residue analysis.

For the safety of the operators, ensure they wear the correct protective clothing and that they are trained in the use of the equipment being used and in the safe handling of pesticides.

7. PESTICIDE STORAGE

Never allow pesticides to contaminate fruits and vegetables, whether these are destined for market or not. No pesticide can be kept in the packhouse, and if any are kept for use in or around the packhouse, they must be locked away and only used under strict supervision.

On the farm all pesticides must be carefully controlled. They must also be kept locked in a safe place where they cannot contaminate produce, or present themselves as a danger to working on the farm.

Records of pesticides in stock either at the packhouse or on the farm, must be maintained. All pesticide records must be open to inspection by field or packhouse staff as well as visiting customer representatives. The main responsibility for the safe storage and handling of pesticides is under the responsibility of the Quality Control Manager.

8. BANNED AND RESTRICTED PESTICIDES

The distinction between "*banned pesticides*" and pesticides that have "*no label recommendation*" in a particular country, must be understood. It is up to the Packhouse Manager/Field Manager to maintain records of all pesticides that can be used on the fruits and vegetables being packed at the packhouse. They must also have a clear understanding concerning the pesticide laws that apply in the importing countries and the way these affect the production and sale of the products being packed for export.

8.1 Banned pesticides

Under no circumstances can a banned pesticide be used on a crop that is to be sold for human consumption. Some pesticides are banned on a world basis, other on a country to country basis. In some cases individual customers place a ban on a particular "active ingredient" on products sold in their stores. A list of the of the "active ingredients" banned on a world wide basis are listed below.

A. Mercury compounds

- Mercury Oxide
- Mercurous Chloride
- Other Inorganic Mercury Compounds
- Alhyl mercury Compounds
- Alhoxylakyl + Aryl Mercury Compounds

B. Persistent organo-chlorine compounds

- Aldrin
- Chlordane
- Dieldrin
- DDT
- Endrin

- HCH, containing less than 99% Gamma Isomer
- Heptachlor
- Hexachlorbenzene
- Camphechlor

C. Other compounds

- Ethelene Oxide
- Nitrofen
- 1,2 Dibromoethane
- 1,2 Dichloroethane
- Dinoseb, its acetates and salts
- Binapacryl
- Captafol
- Dicofol containing less than 78% of p.p. Dicofol or more than 1g/kg of DDT and related compounds
- a) Maleic Hydrazide its salts, other than its choline, potassium and sodium salts.
- b) Choline, potassium and sodium salts of maleic hydrazide containing more than 1 g/kg of free hydrazine expressed on the basis of the acid equivalent.
- Quintozene containing more than 1g/kg HCB or more than 10g/kg pentachlorobenzene.
- (Vinclozolin) - banned by some customers in UK.

In addition to this list, there may be other active ingredients that have a local country ban in Sri Lanka, these must be included in this Packhouse Manual for reference, as they are established.

8.2 Restricted pesticides

Restricted pesticides are those that do not have a label recommendation in a particular country, but they are not included on any banned list of pesticides. A pesticide can only be applied to a crop if there is a specific recommendation contained on the product label which sets out the conditions under which it can be applied. If the label does not contain a recommendation for use on a particular crop or against a particular pest or disease, the product cannot be used.

Different climatic conditions, different pests and disease problems all play their part in the way pesticides behave in a crop. It is these factors that are considered before recommendations are made. In other words, what is considered unsafe in one country may be completely safe in another, under different climatic conditions.

8.3 Safety

The safety of the operator who applies the pesticide must be considered at all times. Use protective clothing if this is contained on the product label. Do not allow contaminated clothing with pesticides into the packhouse.

9. FIELD RECORDS

Each grower must maintain a record of pesticides used, a copy of this has to be kept at the packhouse. The Field Extension Officers are responsible for ensuring that the growers carry out this instruction. The Pesticide Record sheets will be inspected by the Supermarket Representative when visiting the packhouse.

The mandatory pesticide application details that have to be recorded in E.E.C. countries is far reaching. This includes weather conditions at time of spraying, for example, temperature, wind speed, rainfall, etc at time of spraying. Along with details of products sprayed, water volume, spray pressures etc.

For growers supplying Ace Processing with product for export, this list has been simplified. It is mandatory for them to record the product, both commercial name and active ingredient, water volume per land area and ambient temperature, and the date of spraying.

In addition to pesticide applications, each grower must record fertilizer use, both pre-planting applications and top-dressings. The date of application must be recorded, and any organic manures that have been used.

A Field Record Sheet for grower use is included in this section of the Quality Assurance Manual, pages 7 and 8.

FIELD RECORD SHEET

Sheet FR1

Grower Name:

Grower Number:

Crop:

Area: Acres/Hectares:

Variety:

Extension Officer:

Date Planted:

1. FERTILIZERS

Fertilizer Base Dressing - Application rate kg per Hectare					
Nitrogen:	kg/ha	Date Applied: Compound Fertilizer Applied: Analysis: N P ₂ O ₅ K ₂ O			
Phosphate:	kg/ha				
Potash:	kg/ha				
Other Fertilizers	kg/ha				
Organic Manures:	Tonne/ha	Trace Elements:			

Top-Dressing Fertilizers - Application Rates kg per Hectare					
Date	kg Compound	kg Nitrogen	kg Phosphate	kg Potash	kg Other Fert

2. PESTICIDE APPLICATION

Pre-Planting or Sowing Pesticides					
Date	Product	Active Ingredient	Application Rate	Water Volume	Temp. 'C

Post Planting Pesticides					
Date	Product	Active Ingredient	Application Rate	Water Volume	Temp. 'C

NB Do not spray near to harvest with products with long harvest intervals. Check the product label for details.

SECTION F - QUALITY ASSESSMENTS AND QUALITY CONTROL

	<u>Page</u>
Notes on Product Quality Assessment	49
Product Quality Assessment Sheet - QA2	50
Quality Control Sheet, Incoming Product - QC1	52
Product Packing Quality Control Sheet - QC2	53
Despatch Quality Control Sheet - QC3	55
Shelf Life Recording Sheet, (Cold Store) - QC4	57
Shelf Life Recording Sheet, (Ambient) - QC4	58

NOTES ON PRODUCT QUALITY ASSESSMENTS

Sheet: QA 1

The following guidelines should be used when assessing crop quality, either prior to harvesting to predict possible harvest dates, or to make an assessment to see if the crop is to the required market specification.

1. Always record ambient temperature, product temperature and cold store temperature, if the product is sampled from the cold room.
2. Comment on the general appearance of the product.
3. Make a note of its colour, and see if it meets the product market specification.
4. Record its size, shape, length and diameter, as appropriate.
5. Weigh individual fruits/vegetables, and assess the number of pieces to make up a kg, or a unit pack.
6. Check for signs of dehydration.
7. Check for signs of physical damage, bruising, sun damage or rain damage.
8. Check for any pest or disease damage, remembering to check the inside of the product.
9. Taste a sample, and comment on flavour, texture, taints or any off flavours.
10. Check if the crop has been harvested correctly, eg stem length, knife damage etc.
11. See if there are signs of pesticide residues on the surface of the product.
12. Check sugar and acid levels if these are included in the product specification.
13. Check for correct maturity and see if there are any signs of breakdown due to over maturity.
14. Always cut fruits and vegetables and comment on internal appearance and shape.

Always record the results of the assessment, and include the date and time, along with any other relevant information. Assessment sheets should be attached to a Q.C. report if both are conducted at the same time.

PRODUCT QUALITY ASSESSMENT SHEET

Sheet QA 2

Crop:

Farm No.

Date:

Ambient Temp:

Crop Temp:

Location:

Time:

Crop Maturity	
Size; Shape: Colour: Length: Sugar%	Weight: Firmness: Skin: Diameter:

Crop Damage	
Sun Damage Temperature Rain Dehydration Mechanical Other Bruising <u>Insect</u> External Internal <u>Disease</u> External Internal	Comment

Pesticides		
Visible Skin Residues	Yes:	No:

Last Spray Application		
Product	Date	Harvest Interval

Internal and External Appearance:

Any Other Comments:

Market Suitability:

Signed:

Date:

**PRODUCT PACKING
QUALITY CONTROL SHEET**

Sheet QC 2

Date:

Time:

Packhouse Ambient Temperature:

Product:

1. Market: Country: Customer:	2. Specifications Available: Yes: No:
3. Product On Line Temperatures Sample 1: Sample 2: Sample 3: Sample 4: Sample 5: Sample 6:	Comments

4. Carton Weights	5. Pre-Pack Weights
Sample 1: kg. Sample 2: kg. Sample 3: kg. Sample 4: kg. Sample 5: kg. Sample 6: kg.	Sample 1: gr. Sample 2: gr. Sample 3: gr. Sample 4: gr. Sample 5: gr. Sample 6: gr.

6. Individual Fruits and Vegetables Weights and Dimensions.	7. Correct Carton: Yes: No:																					
<table border="1"> <thead> <tr> <th data-bbox="83 1499 421 1619">Sample No.</th> <th data-bbox="421 1499 606 1619">Weight</th> <th data-bbox="606 1499 806 1619">Dimension</th> </tr> </thead> <tbody> <tr> <td data-bbox="83 1619 421 1678">Sample 1:</td> <td data-bbox="421 1619 606 1678">kg.</td> <td data-bbox="606 1619 806 1678">mm.</td> </tr> <tr> <td data-bbox="83 1678 421 1738">Sample 2:</td> <td data-bbox="421 1678 606 1738">kg.</td> <td data-bbox="606 1678 806 1738">mm.</td> </tr> <tr> <td data-bbox="83 1738 421 1798">Sample 3:</td> <td data-bbox="421 1738 606 1798">kg.</td> <td data-bbox="606 1738 806 1798">mm.</td> </tr> <tr> <td data-bbox="83 1798 421 1858">Sample 4:</td> <td data-bbox="421 1798 606 1858">kg.</td> <td data-bbox="606 1798 806 1858">mm.</td> </tr> <tr> <td data-bbox="83 1858 421 1917">Sample 5:</td> <td data-bbox="421 1858 606 1917">kg.</td> <td data-bbox="606 1858 806 1917">mm.</td> </tr> <tr> <td data-bbox="83 1917 421 1977">Sample 6:</td> <td data-bbox="421 1917 606 1977">kg.</td> <td data-bbox="606 1917 806 1977">mm.</td> </tr> </tbody> </table>	Sample No.	Weight	Dimension	Sample 1:	kg.	mm.	Sample 2:	kg.	mm.	Sample 3:	kg.	mm.	Sample 4:	kg.	mm.	Sample 5:	kg.	mm.	Sample 6:	kg.	mm.	8. Correct Layout in Carton: Yes: No:
Sample No.	Weight	Dimension																				
Sample 1:	kg.	mm.																				
Sample 2:	kg.	mm.																				
Sample 3:	kg.	mm.																				
Sample 4:	kg.	mm.																				
Sample 5:	kg.	mm.																				
Sample 6:	kg.	mm.																				
	9. Correct Carton labeling: Yes: No: Other Comments:																					

10. Product Quality	
Shape: Size: Weight Range: Dimensions: Colour	Breakdown: Taste: Sugar %: Other Comments:

11. Have Shelf Life Samples Been Taken ?	Yes:	No:
---	------	-----

12. Fix Box End Label Here:

13. Any Other Comments by Quality Control Manager:

Signed:

Date:

DESPATCH QUALITY CONTROL SHEET

Sheet: QC 3

Date: Time: Ambient Loading Temp.:°C.

Consignment No: Destination:

Method of Transport: Lorry: Lorry/Air: Reefer:

Temperature of Lorry or Reefer:°C.

Total Number and Weight of Cartons and Other Packs in Consignment				
Products	Cartons		Other Packs	
	Number	Total Wt.	Number	Total Wt.
1.				
2.				
3.				
4.				
5.				
6.				

Individual Carton and Other Packs, Weights and Temperatures						
Product Samples	Carton Weights			Product Temps. °C		
	1	2	3	1	2	3
1.						
2.						
3.						
4.						
5.						
6.						

Total Number of Pallets in Consignment		
Total Number of Other Containers		
Condition of Cartons and Other Packages		
Presentation of Pallet Stacking, etc.		
Pallet or Carton Strapping Used.	Pallets?	Cartons?
Visual Appearance and Presentation		

Other Comments by Quality Control Manager

[Empty rectangular box for comments]

Signed:

Date:

QUALITY CONTROL

SHELF LIFE KEEPING SAMPLES (COLD STORE)

Sheet QC 4/1

Product:

Farm Code No.:

Date of Packing:

Quality Comments - Cold Store Sample			
Day 1		Day 8	
Day 2		Day 9	
Day 3		Day 10	
Day 4		Day 11	
Day 5		Day 12	
Day 6		Day 13	
Day 7		Day 14	

Any Other Comments by Q.C. Manager:

Signed:

Date:

QUALITY CONTROL

SHELF LIFE KEEPING SAMPLES (AMBIENT)

Sheet QC 4/2

Product:

Farm Code No.:

Date of Packing:

Quality Comments - Ambient Sample			
Day 1		Day 8	
Day 2		Day 9	
Day 3		Day 10	
Day 4		Day 11	
Day 5		Day 12	
Day 6		Day 13	
Day 7		Day 14	

Any Other Comments by Quality Control Manager:

Signed:

Date:

SECTION G - PRODUCT PACKING AND LABELLING

	<u>Page</u>
1. Packing	60
2. Packaging	60
3. Weighing	60
4. Labelling	60
5. Quality Control Procedures	61
6. Product Despatch	61
7. Shelf Life Tests	61
8. Product Storage Life	62
7. Product Temperatures and Relative Humidities	62
Vegetables	63
Fruits	64
Specification Sheet, Dubai	65
Specification Sheet, Carton Weights and Sizes	66
Specification Sheet Example	67

1. PACKING

All product must be packed to the specification that the market demands, and written specifications must be prepared for each product and each market being served. In the case of Supermarkets they will normally issue their own specification. All specifications must be accessible for the packing Supervisors and Quality Control staff at all times. The completion of the on-line Quality Control System, *see page 5 in section F*, should eliminate packing to the wrong specification. For non supermarket customers, the Specification sheet on *Page 8* of this section should be completed.

During packing great care must be taken not to damage the produce, as this will reduce its shelf life. This increases the chance of the product being out of specification when it arrives in the market place. It must be remembered that bruising will often only show after a period of time, and may not be obvious during packing, or even when the product is despatched to the market. Therefore all products must be handled with care from harvesting to final packing.

2. PACKAGING

Always make sure the correct packaging is being used, and this must be of the right quality. Again most Supermarket customers will specify the type and quality of packaging that has to be used. All packaging must be clean and free from damage and moisture. See the specification sheets for details.

3. WEIGHING

During packing and weighing always allow for the weight of the packaging materials in the tare weight. The total tare weight on any pre-pack or carton, must also allow for weight loss of the product during shipment. Supermarket customers will always specify the tare weight for each product being packed. Where product is sold in other markets, an assessment will have to be made on packaging material weight and weight loss due to moisture loss. This must be added on to the overall weight of the packed product. This can usually be done by adding the tare weight into the scales memory, or with some mechanical scales these can be adjusted to include the tare weight. For examples see page 7 in this section.

NB. In many markets an average weight of pre-packs in a carton, or an average weight of cartons in a consignment is illegal, even if the total weight of the consignment is correct. Each pre-pack or carton must therefore be of the correct net and gross weight or count if the product is packed to a count, weight or size specification.

4. LABELLING

Each pack or carton must be correctly labelled, it is an offense in most countries if labelling does not meet their legal requirements. Product will be rejected if it is incorrectly labelled. Generally the following information is mandatory:

Name of Product, sometimes variety may have to be included.
Net Weight. (Gross weight may be required)
Number of pieces if sold by count.
Name of packer.
Country of origin.
Class, EEC classification. (Normally only "Class 1" is allowed.)

Some customers may require in addition:

Grower reference number and or Packhouse reference number.
Date of packing.
Colour, where products are sold by colour, in addition to size, weight etc..

5. QUALITY CONTROL PROCEDURES

The Quality Control Manager and his team are ultimately responsible for the quality of the product leaving the packhouse. If the product is not up to standard to meet the market specification then packing must stop. The product can be packed for another market if a different specification can be met.

See section "F" for notes on Product Quality Assessments and Quality Control Record Sheets.

6. PRODUCT DESPATCH

When product leaves the packhouse it must be at the correct temperature for the product. See page 4 of this section. The boxes must be clean and dry and correctly stacked on the pallet or in the container. Never leave product outside the cold store for any longer than necessary for loading. Always make sure the vehicle or container is also at the correct despatch temperature before loading commences. Generally for vehicles, the refrigerator unit should be switched on at least one hour before loading starts. This applies to other containers which have refrigeration equipment installed.

Make sure all boxes and pallets are secure, strap boxes together and strap all pallet loads.

Always complete the out-loading Q.C. "Report Sheet" (QC3) as a final check that the consignment is both up to the required specification and quantity.

7. SHELF LIFE TESTS

A sample of each product must be kept in cold store as a shelf life sample, for the same period as the consignment remains in the cold chain system to its final destination. At the end of the cold chain cycle these samples must be moved to ambient storage for a further period of three days to simulate the purchasers storage time before eating the product.

These samples are the reference points in situations of complaint by the end customer when product deterioration occurs. A copy of a recording sheet can be found on page 7 in section F of this manual, the Quality Control Section.

8. PRODUCT STORAGE LIFE

The maximum storage life of a product is influenced by a number of factors, eg crop maturity, harvesting system and handling, speed of cooling, cooling temperature, crop production system and nutrition etc. The tables on pages 4 and 5 in this section give an indication of the average storage life of a range of crops that may be marketed by Ace Processing. These figures must be used as a guide, because of the constraints listed above, but they will give the approximate maximum journey times to various destination points, if the correct temperature conditions are maintained.

9. PRODUCT TEMPERATURES AND RELATIVE HUMIDITIES

The following is a guide to the correct pre-cooling temperatures, storage temperatures and relative humidities for the products being packed by Ace Processing Ltd.

Product Storage Temperatures & Humidities, Vegetables

PRODUCT Vegetables	Pre-Cooling Temp °C	Storage Temp. °C	Cold Store No.	R.H. %	Expect. Storage Life.
Aubergine	15	8-12	3	90-95	14 days
Babycorn	10	0-1	1	95-100	7 days
Beans	12	7-8	2	95-100	14 days
Cabbage	10	0-1	1	95-100	1 month
Chillies	12	7-10	3	90-95	21 days
Cucumber	15	10-13	4	90-95	14 days
Gourds, except Snake Gourd	15	10-12	3	90-95	1 month
Kins Ala	20	13-16	4	90-95	
Manioc	10	0-2	1	85-90	5 month
Okra	12	7-10	3	95-100	14 days
Polos	20	13-16	4	90-95	14 days
Red Beet	10	0-1	1	95-100	1 month
Red Onion	10	0-1	1	70-80	2 month
Sweet Potato	20	13-16	4	85-90	1 month
Yams	20	16	4	70	2 month
Snake Gourd	15	10-12	3	90-95	10 days

For Babycorn, Okra, Beans, Aubergine, Polos, and Cucumber the above times are maximum storage periods for sound, well grown vegetables, that have been harvested at the correct maturity. The other crops, eg pumpkin, Gourds, etc., indicate minimum storage periods. For good quality products storage periods may well be longer. For Kins Ala there is no data available for this type of crop, it should therefore be treated as a short term storage crop until trials are completed.

Product Storage Temperatures & Humidities, Fruits

PRODUCT Fruits	Pre- Cooling Temp °c	Storage Temp. °C	Cold Store No.	R.H. %	Expect. Storage Life.
Banana	20	15	4	85-90	10-20 days
King Coconut	20	15	4	90	20 days
Mango	20	12-14	4	90	21 days
Mangosteen	10	4-4.5	1	90	6 weeks
Melon	15	7-10	3	90	1-3 wks
Papaya	15	10	3	90	3-4 wks
Pineapple	20	10-13	4	90	3-4 wks

The length of storage of all fruits depends on the maturity of the crop. Storage life becomes shorter as the fruit matures. The above figures are guide periods for fruits that are under mature. Further experience will allow these figures to be amended according to the maturity required in the different market places. Storage life reduces when fruits are damaged in picking, transporting and packing.

SPECIFICATION SHEET - DUBAI MARKET

PRODUCT	LENGTH	DIAMETER	WEIGHT	SHAPE
Green Beans	15-16cm	1-1.2cm	N.A.	Straight
Cucumber	15-16cm	9-10cm	500-800g	Oval
Aubergine	12-14cm	5-6cm	100-120g	Oval & Long
Sweet Potato	15-17cm	4-5cm	70-100g	Round & Oval
Maniok	22-30cm	5-7cm	300-600g	Long
Snake Gourd	30-40cm	5-6cm	150-300g	Straight/Long
Pumpkin	14-15cm	16-18cm	800-1000g	Round
Kehel Muwa	18-20cm	8-9cm	500-600g	Flower Shape
Polos	15-17cm	8-9cm	500-800g	Round/Oval
Apple Banana	10-12cm	3.5-4.0cm	80-100g	N.A.
Pineapple	13-15cm	8-10cm	800-1000g	Oval/Round
Papaya	20-22cm	9-10cm	800-1200g	Oval/Long Straight

Data supplied by Max Buultjens.

SPECIFICATION SHEET - DUBAI MARKET

CARTON WEIGHTS

PRODUCT	PRODUCT NET WT	TARE WT	CARTON WEIGHT	GROSS WEIGHT	CARTON SIZE cm.
Green Beans	5.0kg	0.1kg	0.5kg	5.6kg	30X40X15
Cucumber	15kg	0.15kg	0.85kg	16kg	60x30x20
Aubergine	5.0kg	0.1kg	0.5kg	5.6kg	30x40x15
Sweet Potato	8.0kg	0.1kg	0.5kg	8.6kg	30x40x15
Maniok	15kg	0.15kg	0.7kg	15.85kg	60x30x20
Snake Gourd	10.0kg	0.15kg	0.7kg	10.85kg	60x30x20
Pumpkin	-	-	-	-	-
Kehel Muwa	Count x20	0.15kg	0.5kg	11kg	60x30x20
Polos	15kg	0.15kg	0.7kg	15.85kg	60x30x20
Bananas: Apple and Ambul	3.5kg	0.1kg	0.5kg	4.1kg	45x25x11
Pineapple	Count 12	0.15kg	0.7kg	11kg	60x30x20
Papaya	Count x8 9-11kg	0.15kg	0.7kg	10.85kg	60x30x25
Okra	5kg	0.1kg	0.5kg	5.6kg	30x40x15
Kinsala	8.0kg	0.1kg	0.5kg	8.6kg	30x40x15
King Coconut	Count x8	10-13kg	1.0kg	11-14kg	60x30x20
Banana: Curry	10kg	0.15kg	0.7kg	10.85kg	60x30x20

Based on current carton range.

SPECIFICATION SHEET

PRODUCT:

COUNTRY:

CLASS:

CUSTOMER:

1. MATURITY

External Colour:	Internal Colour:
Weight:	Shape:
Size:	Length:
Texture:	Diameter:
Density:	Flavour:
Sugar %:	Acid %:

2. COLD STORAGE CONDITIONS

Cold Store Temperature: °C	Flesh Temperature: °C
Maximum Storage Period: Days	
Relative Humidity % :	
Holding Period Before Packing: Days	Maximum Storage After Packing: Days

3. PACKING

Pre-Pack Weight : gr.	<u>Packaging Materials:</u> Size Weight Cartons : Other : Pre-Packs:
Individual Weights: gr.	
Size Range : mm.	
Number Pieces Per Carton:	<u>Customer Receiving Temperature Range:</u> Minimum: Maximum:
Carton Net Weight : kg.	
Tare Weight : grams. (Wt. Loss Factor)	Other Specs:

SECTION H - LIST OF OUT-GROWER'S

OUT-GROWER'S NAMES, ADDRESSES AND CODE NUMBERS

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
1	Mr R.K. Gunadasa Therunnansagama Tunkama	x			
2	Mr M. Somasiri Therunnansagama Tunkama	x			
3	Mr E.A. Deepal Therunnansagama Tunkama	x		x	
4	Mr W.P. Pathirana Therunnansagama Tunkama	x			
5	Mr S.P. Gunadasa Therunnansagama Tunkama	x			
6	Mr A.G. Yapa Therunnansagama Tunkama	x			
7	Mr M.G. Premaratne Therunnansagama Tunkama	x			
8	Mr A.N. Bamunusinghe Therunnansagama Tunkama	x			
9	Mr P.H. Gamage Kanamadi Ara Rathmalwala			x	
10	Mr M.P. Premadasa Kanamadi Ara Rathmalwala			x	

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
11	Mr G.G. Weerasena Kanamadi Ara Rathmalwala	x			
12	Mr Martin Liyanage Therunnansagama Tunkama	x			
13	Mr W.K. Saradiyas	x			
14	Mr J.A. Piyaseri	x			
15	Mr M.K. Gunapala Therunnansagama Tunkama	x	x		
16	Mr Sanath Harendra Therunnansagama Tunkama	x			
17	Mr K.P. Anura Therunnansagama Tunkama	x			
18	Mr H.M. Ariyadasa Therunnansagama Tunkama	x			
19	Mr Dayananda Gamage Therunnansagama Tunkama	x			
20	Mr H.B. Gunapala Kanamadi Ara Rathmalwala	x			
21	Mr S.A. Chandrapala Kanamadi Ara Rathmalwala	x			
22	Mr H.G. Jinadasa Kanamadi Ara Rathmalwala	x			

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
23	Mr D.D. Sunil Kanamadi Ara Rathmalwala	x			
24	Mr W.G. Wimalasiri Kanamadi Ara Rathmalwala	x			
25	Mr P. Abekoon Therunnansagama Tunkama	x			
26	Mr M.D. Dissanayake Y.S.S. Tunkama	x			
27	Mr Sarath Ranawaka Therunnansagama Tunkama	x			
28	Mr P.V. Darmadasa Kanamadi Ara Rathmalwala			x	
29	Mr R.G. Karunaratne Kanamadi Ara Rathmalwala			x	
30	Mr D.D. Karunaratne Kanamadi Ara Rathmalwala			x	
31	Mr R.G. Peter Koankatuwa Panamura	x	x		
32	Mr K.R. Charlis Bandokkayaya Panamura	x	x		
33	Mr D.D. Wickremasinghe Bandokkayaya Panamura	x	x		

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
34	Mr H.V. Ariyadasa Kanamadi Ara Rathmalwala		x		
35	Mr A.M. Darmadasa Bandokkayaya Panamura	x	x		x
36	Mr S. Wilson Bandokkayaya Panamura	x			
37	Mr H.M. Premarathna Bandokkayaya Panamura	x			
38	Mr Jayalath Kumarasinghe (W. Sugathapala) Koankatuwa Panamura	x		x	x
39	Mr L.K. Suranga Y.S.S. Tunkama	x	x		
40	Mr K.G. Alpenis Kanamadi Ara Rathmalwala			x	
41	Mr W.K. Athukorale Y.S.S. Tunkama			x	
42	Mr Ranjith Gamage Koankatuwa Panamura				x
43	Mr H. Piyasena Koankatuwa Panamura				x
44	Mr G. Ginadasa Y.S.S. Tunkama				x

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
45	Mr K. Gunasekera Y.S.S. Tunkama				x
46	Mr Sanath Jayantha Koankatuwa Panamura		x		x
47	Mr K.G. Sumathipala Kanarnadi Ara Rathmalwala	x			x
48	Mr Jayaratne Hettiarachchi Y.S.S. Tunkama	x			
49	Mr W.J.W. Abeyratne Koankatuwa Panamura	x			
50	Mr N.P. Dharmadasa Bandokayaya Panamura	x			
51	Mr P.S. Amarasena Bandokayaya Panamura	x			
52	Mr B. Gunatilake Bandokayaya Panamura	x			
53	Mr Basil Sarathchandra Kiralawalkatuwa Embilipitiya		x	x	
54	Mr K.S. Pathirana			x	
55	Mr B. Nandasena Y.S.S. Tunkama		x		

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
56	Mr Premadasa Wickremasinghe Y.S.S. Tunkama	x	x		
57	Mr B.D.H. Weerasinghe Y.S.S. Tunkama	x	x		x
58	Mr R.G. Premadasa Y.S.S. Tunkama	x	x		
59	Mr B. Liyanage Kanamadi Ara Rathmalwala				x
60	Mahaweli Livestock Farm Tunkama Embilipitiya				x
61	Mr W.M. Wijesiri Katchchiegala Tunkama	x			
62	Mr H.K. Hemarathne Koankatuwa Panamura	x			
63	Mr P.D. Ranasinghe Katchchigala Tunkama	x	x		
64	Mr W.N. Piyasena Katchchigala Tunkama	x			
65	Mr M.D. Wijithasiri Kanamadi Ara Rathmalwala	x			
66	Mr V.P. Charlis Koankatuwa	x			

Reg. No.	Name & Address	Planted Crop			
		Chillie	Y.L. Bean	Aub.	Okra
67	Mr D.G. Karunadasa Y.S.S. Tunkama	x			
68	Mr P.D. Jayawardana Katchchigala Tunkama	x			
69	Mr Sumith Ekanayake Koankatuwa Panamura				x
70	Mr R.W.A. Sunil Galamuna Road Koankatuwa			x	

SECTION I - PESTICIDE MAXIMUM RESIDUE LIMITS

	<u>Page</u>
Introduction	1
Maximum Residue Limits for Fruits and Vegetables	3
Explanatory Notes	12

NB. These residue limits have been ammended from February 1994. The revised figures will be supplied when available.

1988 No. 1378

P E S T I C I D E S

The Pesticides (Maximum Residue Levels in Food)
Regulations 1988

Made - - - - - *1st August 1988*

Coming into force

except for regulation 3(b) and Schedule 2 *2nd August 1988*

Remainder *31st December 1988*

The Minister of Agriculture, Fisheries and Food and the Secretary of State, acting jointly, in exercise of the powers conferred on them by sections 16(2)(k) and (l), (15) and 24(3) of the Food and Environment Protection Act 1985(a) and of all other powers enabling them in that behalf, after consultation with the Advisory Committee on Pesticides established under section 16(7) of that Act(b), hereby make the following Regulations a draft whereof has been laid before and approved by resolution of each House of Parliament:-

Title and commencement

1. These Regulations may be cited as the Pesticides (Maximum Residue Levels in Food) Regulations 1988 and shall come into force on the day after the day on which they are made, except for regulation 3(b) and Schedule 2, which shall come into force on 31st December 1988.

Interpretation

2.—(1) In these Regulations, unless the context otherwise requires-

“food” includes cereals intended for human consumption listed in Schedules 1 and 2;

“maximum residue level” in the case of any food, in relation to any pesticide used in connection therewith, means the figure obtained at the point in Schedule 1 or 2 where a line drawn vertically from the reference to that pesticide intersects with a line drawn horizontally from the reference to that food;

“pesticide” means a pesticide specified in Schedule 1, 2 or 3;

“residue” in relation to any pesticide means one or more of the substances specified in an entry in column 2 of Schedule 3 alongside the entry of that pesticide in column 1 of that Schedule.

(2) Any reference in a Schedule to a food, figure or pesticide includes any qualifying words relating to that food, figure or pesticide in that Schedule.

(3) Any reference in these Regulations to a Schedule shall be construed as a reference to a Schedule to these Regulations.

(a) 1985 c.48.

(b) Established by S.I. 1985/1516.

Maximum residue levels

3. No person may leave or cause to be left—
- (a) in any food specified in Schedule 1,
 - (b) in any food specified in Schedule 2,
- a level of residue exceeding any maximum residue level applicable to such food specified in that Schedule.

Seizure or disposal of food

4. If any food has in it a residue level in excess of any maximum residue level relating to that food, either of the Ministers shall have power—
- (a) to seize or dispose of the consignment containing that food or any part of it, or to require that some other person shall dispose of it, or
 - (b) to direct some other person to take such remedial action as appears to the Minister to be necessary.

Sampling

5. The level of residue in a food shall be determined as far as practicable in accordance with the procedures laid down in Parts 5 and 6 of the Guide to Codex Recommendations Concerning Pesticide Residues(a).

In witness whereof the Official Seal of the Minister of Agriculture, Fisheries and Food is hereunto affixed on 28th July 1988.

(L.S.)

John MacGregor
Minister of Agriculture, Fisheries and Food

28th July 1988

Sanderson of Bowden
Minister of State, Scottish Office

1st August 1988

Peter Walker
Secretary of State for Wales

1st August 1988

Edwina Currie
Parliamentary Under-Secretary of State,
Department of Health

SCHEDULE 1

Regulation

Group in which food belongs	Food	Pesticides																							
		Aldrin & Dieldrin	Captafol	Carbaryl	Carbon Disulphide	Carbon Tetrachloride	Chlordane	DDT	Diazinon	1,2-Dibromoethane	Dichlorvos	Endosulfan	Endrin	Hexachloro-benzene (HCB)	Hexachloro-cyclohexane (HCH)	Heptachlor	Hydrogen Cyanide	Hydrogen Phosphide	Inorganic Bromide	Malathion	Methyl Bromide	Phosphamidon	Pyrethrins		
Cereals	Wheat	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02	β γ sum of α and β	0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Rye	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Barley	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Oats	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Maize	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.2	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Rice ¹	0.01	0.05*	1	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
	Other Cereals ²	0.01	0.05*	0.5	0.1	0.1	0.02	0.05	0.05	0.05*	2	0.1	0.01	0.01	0.02		0.1	0.01	15	0.1	50	8	0.1	0.05	3
Products of Animal Origin	Meat, Fat and Preparations of Meat ³	0.2					0.05	1					0.05	0.2	0.2	0.1	2*1	0.2							
	Milk ⁴	0.006					0.002	0.04					0.0005	0.01	0.004	0.003	0.005	0.004							
	Dairy Produce ⁵ (> 2% Fat)	0.15					0.05	1					0.02	0.25	0.1	0.075	0.2	0.1							

UNITS:

Maximum residue levels (MRLs) are expressed in milligrammes of residue per kilogramme of food.

KEY:

* Level at or about the limit of determination.

FOOTNOTES:

¹ Paddy rice.

² 'Other cereals' do not include rice.

³ Levels are measured on fat, except in the case of foods with a fat content of 10% or less by weight. In these cases the residue is related to the total weight of the boned foodstuff, and the MRL is one of the value given in the table, but must be no less than 0.01 mg/kg.

⁴ These levels are for fresh raw cow's milk and fresh whole cream cow's milk expressed on the whole milk.

⁵ For preserved, concentrated or sweetened cow's milk; for raw milk and whole cream milk of another animal origin; and for butter, cheese or curd whether made from cow's milk or other milk combination, the following levels apply:

— if the fat content is less than 2% by weight, the MRL is taken as half that set for raw milk and whole cream milk;

— if the fat content is 2% or more by weight, the MRL is expressed in mg/kg of fat and is set at 25 times that set for raw milk and whole cream milk.

⁶ Sheepmeat only.

⁷ All meat except sheepmeat

SCHEDULE 2

Regulation 3(b)

Group to which food belongs	Food	Pesticides																									
		Aldrin & Dieldrin	2-Aminobutane	Aminotriazole (Amitrole)	Azinphos-methyl	Bifenthrin	Captan	Captan	Carbaryl	Carbendazim	Carbophenothion	Chlordane	Chlorfenvinphos	Chlorpyrifos-methyl	DDT	Diazinon	1,2-Dibromochthane	Dichlorofluorid	Dichlorvos	Dicofol	Diflubenzuron	Dimethipin	Dimethoate	Dithiocarbamates	Endosulfan	Endrin	
Cereals	Wheat								0.5				10														
	Rye								0.5				10														
	Barley								0.5				10														
	Oats								0.5				10														
	Maize												10														
	Rice ¹												10														
	Other Cereals ²												10														
Products of Animal Origin	Meat, Fat and Preparations of Meat ¹											0.2	0.05		0.7				0.05		0.05*						
	Milk ⁴								0.1*			0.008	0.01		0.02				0.02		0.05*						
	Dairy Produce ³ (> 2% Fat) Eggs ⁶	0.1							0.1*	0.02		0.05	0.5						0.05*		0.05*					0.2	
Citrus Fruit	Oranges	0.05	5	0.05* 2			0.05* 0.1	7	10	2	0.02* 1			1	0.5	0.01	5	0.1	5	1		2			2	0.02	
	Other Citrus	0.05	5	0.05* 2			0.05* 0.1	7	10	2	0.02* 1			1	0.5	0.01	5	0.1	5	1		2			2	0.02	
Pome Fruit	Apples	0.05		0.05* 1	1		0.05* 3	5	5	1	0.02* 0.05			0.1	0.5	0.01	5	0.1	5	1		1	3	2	0.02		
	Pears	0.05		0.05* 1	1		0.05* 3	5	5	1	0.02* 0.05			0.1	0.5	0.01	5	0.1	5	1		1	3	2	0.02		
Stone Fruit	Peaches and Nectarines	0.05		0.05* 4	1		0.05 2	10	10	1	0.02* 0.05			0.1	0.5	0.01	5	0.1	5			2	3	2	0.02		
	Plums	0.05		0.05* 1	1		0.05 2	10	2	1	0.02* 0.05			0.1	0.5	0.01	5	0.1	5	1		2	1	2	0.02		
Berries, Small Fruit and Soft Fruit	Grapes	0.05		0.05* 2			0.05* 3	5	10		0.02* 0.05			0.1	0.5	0.01	15	0.1	5			1	5	2	0.02		
	Strawberries	0.05		0.05* 1			0.05* 3	7	5		0.02* 0.05			0.1	0.5	0.01	10	0.1	5			1	3	2	0.02		
	Raspberries	0.05		0.05* 1			0.05* 3	10	5		0.02* 0.05			0.1	0.5	0.01	15	0.1	5			1	5	2	0.02		
	Blackcurrants	0.05		0.05* 1			0.05* 3	10	5		0.02* 0.05			0.1	0.5	0.01	15	0.1	5			2	5	2	0.02		
Assorted Fruit	Bananas	0.05		0.05* 1	0.5		0.05* 0.1	5	1		0.02* 0.05			1	0.5	0.01	5	0.1	5			1	1	2	0.02		
Roots and Tubers and Vegetables	Potatoes	0.05	50	0.05* 0.2			0.05* 0.1	0.2	3		0.02* 0.5			0.1	0.5	0.01	0.1	0.5	5		0.1*	0.05	0.1	0.2	0.02		
	Carrots	0.05		0.05* 0.5			0.05* 0.1	2			0.02* 0.5			0.1	0.5	0.01	5	0.5	5			1	0.5	0.2	0.02		
	Turnips	0.05		0.05* 0.5			0.05* 0.1	1			0.02* 0.5			0.1	0.5	0.01	5	0.5	5			1		2	0.02		
	Swedes	0.05		0.05* 0.5			0.05* 0.1	2			0.02* 0.5			0.1	0.5	0.01	5	0.5	5			1		2	0.02		

Bulb Vegetables	Onions	0.05	0.05* 0.5	0.05* 0.1	1	2	0.02* 0.5	0.1	0.5	0.01	5	0.5	5		1	1	0.02	
Fruiting Vegetables	Tomatoes	0.05	0.05* 0.5	0.05* 2	5	5	0.02* 0.1	0.1	0.5	0.01	5	0.5	1	1	1	3	2	0.02
	Cucumbers	0.05	0.05* 0.5	0.05* 0.1	3	0.5	0.02* 0.1	0.1	0.5	0.01	5	0.5	2		2	0.5	2	0.02
Brassica Vegetables	Cabbage	0.05	0.05* 0.5	0.05* 0.1	5		0.02* 0.1	0.1	0.5	0.01	5	0.5	5	1	2		2	0.02
	Cauliflowers	0.05	0.05* 0.5	0.05* 0.1	1		0.02* 0.1	0.1	0.5	0.01	5	0.5	5		2		2	0.02
	Brussels Sprouts	0.05	0.05* 1	0.05* 0.1	1	0.5	0.02* 0.1	0.1	0.5	0.01	5	0.5	5	1	2		2	0.02
Legume Vegetables	Beans	0.5	0.05* 0.5	0.05* 2	5		0.02* 0.1	0.1	0.5	0.01	5	0.5	5		2		2	0.02
	Peas	0.5	0.05* 0.5	0.05* 2	5		0.02* 0.1	0.1	0.5	0.01	5	0.5	5		2	0.5	2	0.02
Stem Vegetables	Celery	0.5	0.05* 2	0.05* 0.1	3	2	0.02* 0.5	0.1	0.5	0.01		0.5	5		1		2	0.02
	Leeks	0.5	0.05* 0.5	0.05* 2	1		0.02* 0.1	0.1	0.5	0.01	5	0.5	5		1		2	0.02
Leaf Vegetables	Lettuce	0.05	0.05* 0.5	0.05* 2	10	5	0.02* 0.1	0.1	0.5	0.01	10	1	5				2	0.02
Fungi	Mushrooms	0.05	0.05*	0.05* 0.1	1	1	0.02* 0.05	0.1	0.5	0.01		0.5	5	0.1	1			0.02

Units, Keys and Footnotes are at the end of this Schedule.

SCHEDULE 2 - continued

Group in which food belongs	Food	Pesticides																								
		Ethion	Erifos	Fenitrothion	Fluazifop	Flurochloridone	Fifaloxfop	Hexachloro-benzene (HCB)	Hexachlorocyclohexane (HCH) γ	Heptachlor	Imazalil	Inorganic Bromide	Ioxynil	Iprodione	Malathion	Mercury Compounds	Methacrifos	Mevinphos	Omethoate	Parathion	Parathion-methyl	Phosalone	Pirimiphos-methyl	Quintozene	Tecnazene	
Cereals	Wheat		10	10											0.02	10								10		
	Rye		10	10											0.02	10									10	
	Barley		10	10											0.02	10									10	
	Oats		10	10											0.02	10									10	
	Maize		10	10											0.02	10									10	
	Rice ¹																									
	Other Cereals		10	10											0.02	10									10	
Products of Animal Origin	Meat, Fat and Preparations of Meat ²																									
	Milk ⁴																									
	Dairy Produce ⁵ (> 2% Fat)																									
	Eggs ⁶							1	0.1	0.05																
Citrus Fruit	Oranges	2		2					1	0.01	5/0.1 ⁷	30		2			0.2	1	1	0.2	1			0.5		
	Other Citrus	2		2					1	0.01	5/0.1 ⁷	30		2			0.2	1	1	0.2	1			0.5		
Pome Fruit	Apples	0.5		0.5			0.05*		1	0.01*		20	10	0.5	0.02		0.2	1						2		
	Pears	0.5		0.5			0.05*		1	0.01*		20	10	0.5	0.02		0.2	1						2		
Stone Fruit	Peaches and Nectarines	0.5		0.5					1	0.01*		20	10	0.5			0.5	1						2		
	Plums	0.5		0.5					1	0.01*		20	10	0.5			0.5	1						1		
Berries, Small Fruit and Soft Fruit	Grapes	0.5		0.5					0.5	0.01*		20	10	0.5			0.1	1						1		
	Strawberries	0.1		0.5					3	0.01*		30	10	0.5			0.1	1						1		
	Raspberries	0.1		0.5					3	0.01*		20	5	0.5			0.1	1						1		
	Blackcurrants	0.1		0.5					3	0.01*		20	5	0.5			0.1	1						1		
Assorted Fruit	Bananas	0.1		0.5					1	0.01*		20						0.2						1	1	
Roots and Tuber Vegetables	Potatoes			0.05*	0.1	0.01*			0.05*	0.05				0.5	0.02		0.1	0.05					0.1*		0.2	
	Carrots	0.1		0.5		0.01*			0.2	0.2				0.5	0.02		0.1	0.2					0.1			
	Turnips	0.1		0.5		0.01*			1	0.05				0.5	0.02		0.1	0.2					0.1			
	Swedes	0.1		0.5		0.01*			1	0.05				0.5	0.02		0.1	2					0.1			

Bulb Vegetables	Onions	0.1	0.5	0.01*	1	0.05		0.1	0.1	3	0.02	0.1	0.1	1
Fruiting Vegetables	Tomatoes	0.1	0.5		2	0.02	75			3	0.02	0.1	1	1
	Cucumbers	0.1	0.5		1	0.05	50	5	5	3	0.02	0.1	1	1
Brassic Vegetables	Cabbage	0.1	0.5		2	0.05				3	0.02	0.1	0.2	1
	Cauliflowers	0.1	0.5		2	0.05	100			3	0.02	0.1	0.2	1
	Brussels Sprouts	0.1	0.5		2	0.05				3	0.02	0.1	0.2	1
					2	0.05				3	0.02	0.1	0.2	1
Legume Vegetables	Beans	0.1	0.5		1	0.05				3		0.1	0.2	1
	Peas	0.1	0.5		0.1	0.05				3		0.1	0.2	1
Stem Vegetables	Celery	0.1	0.5		1	0.05				3	0.02	0.1	0.2	1
	Leeks	0.1	0.5		1	0.05				3	0.02	0.1	0.2	1
Leaf Vegetables	Lettuce	0.1	0.5		2	0.05				3	0.02	0.1	0.2	1
										3	0.02	0.5	0.2	1
Fungi	Mushrooms	0.1	0.5		1	0.05				3	0.02	0.1	0.2	1

Units, Keys and Footnotes are at the end of this Schedule.

BEST AVAILABLE DOCUMENT

SCHEDULE 2 - continued

Group to which food belongs	Food	Pesticides			
		Thiabendazole	Triazophos	2,4,5-T	Vinclozolin
Cereals	Wheat Rye Barley Oats Maize Rice ¹ Other Cereals ²				
Products of Animal Origin	Meat, Fat and Preparations of Meat ³ Milk ⁴ Dairy Produce ⁵ (> 2% Fat) Eggs ⁶				
Citrus Fruit	Oranges Other Citrus		0.05 0.05		
Pome Fruit	Apples Pears		0.05 0.05	1 1	
Stone Fruit	Peaches and Nectarines Plums		0.05 0.05	5 5	
Berries, Small Fruit and Soft Fruit	Grapes Strawberries Raspberries Blackcurrants		0.05 0.05 0.05 0.05	5 10 5 5	
Assorted Fruit	Bananas		1 0.05		
Roots and Tuber Vegetables	Potatoes Carrots Turnips Swedes	5	0.05* 0.1 0.05 0.05	0.05 0.05 0.05 0.05	0.1

BEST AVAILABLE DOCUMENT

Bulb Vegetables	Onions	0.05*	0.05	1
Fruiting Vegetables	Tomatoes		0.05	3
	Cucumbers		0.05	1
Brassica Vegetables	Cabbage	0.1	0.05	1
	Cauliflowers		0.05	1
	Brussels Sprouts	0.1	0.05	
Legume Vegetables	Beans		0.05	2
	Peas		0.05	1
Stem Vegetables	Celery		0.05	5
	Leeks		0.05	
Leaf Vegetables	Lettuce		0.05	5
Fungi	Mushrooms		0.05	

UNITS:

Maximum residue levels (MRLs) are expressed in milligrammes of residue per kilogramme of food.

KEY:

* Level at or about the limit of determination.

FOOTNOTES:

¹ Paddy rice.

² 'Other cereals' do not include rice.

³ Levels are measured on fat, except in the case of foods with a fat content of 10% or less by weight. In these cases the residue is related to the total weight of the boned foodstuff, and the MRL is one tenth of the value given in the table, but must be no less than 0.01 mg/kg.

⁴ These levels are for fresh raw cow's milk and fresh whole cream cow's milk expressed on the whole milk.

⁵ For preserved, concentrated or sweetened cow's milk; for raw milk and whole cream milk of another animal origin; and for butter, cheese or curd whether made from cow's milk or other milk or a combination, the following levels apply:

— if the fat content is less than 2% by weight, the MRL is taken as half that set for raw milk and whole cream milk;

— if the fat content is 2% or more by weight, the MRL is expressed in mg/kg of fat and is set at 25 times that set for raw milk and whole cream milk.

⁶ Birds' eggs in shell (other than eggs for hatching) and whole egg products and egg yolk products (whether fresh, dried or otherwise prepared).

⁷ Imazalil: 5 mg/kg applies to whole fruit;

0.1 mg/kg applies to fruit without peel.

SCHEDULE 3

Regulation 2

(1) <i>Pesticides</i>	(2) <i>Residues</i>
Aldrin & Dieldrin	singly or combined, expressed as dieldrin (HEOD)
2-Aminobutane	2-aminobutane
Aminotriazole	aminotriazole
Azinphos-methyl	sum of azinphos-methyl and azinphos-ethyl
Bitertanol	bitertanol
Captafol	captafol
Captan	sum of captan and folpet
Carbaryl	carbaryl
Carbendazim	carbendazim (from use of benomyl, thiophanate-methyl and carbendazim) *
Carbon disulphide	carbon disulphide
Carbon tetrachloride	carbon tetrachloride
Carbophenothion	sum of carbophenothion, its sulphoxide and its sulphone, expressed as carbophenothion
Chlordane	(1) for products of animal origin: sum of <i>cis</i> - and <i>trans</i> - isomers and oxychlordane expressed as chlordane; (2) for cereals, fruit and vegetables: sum of <i>cis</i> - and <i>trans</i> - isomers expressed as chlordane
Chlorfenvinphos	sum of E- and Z- isomers of chlorfenvinphos
Chlorpyrifos-methyl	chlorpyrifos-methyl
DDT	sum of pp' -DDT, op' -DDT, pp' -DDE and pp' -DDE expressed as DDT
Diazinon	diazinon
1,2-Dibromoethane	1,2-dibromoethane
Dichlofluanid	dichlofluanid
Dichlorvos	dichlorvos
Dicofol	dicofol
Diflubenzuron	diflubenzuron
Dimethipin	dimethipin
Dimethoate	dimethoate
Dithiocarbamates	alkylenebisdithiocarbamates and alkylthiuramdisulphides and dialkyldithiocarbamates determined and expressed as carbon disulphide (CS ₂)
Endosulfan	sum of alpha- and beta- isomers and of endosulfan sulphate, expressed as endosulfan
Endrin	endrin
Ethion	ethion
Etrimfos	sum of etrimfos, its oxygen analogue and 6-ethoxy-2-ethyl-4-hydroxypyrimidine
Fenitrothion	fenitrothion
Fluazifop	fluazifop and esters (including conjugates) of fluazifop, expressed as free acid
Flurochloridone	flurochloridone
Haloxypop	haloxypop and esters (including conjugates) of haloxypop, expressed as free acid
Hexachlorobenzene (HCB)	hexachlorobenzene
Hexachlorocyclohexane (HCH)	hexachlorocyclohexane alpha- isomer beta- isomer gamma- isomer
Heptachlor	sum of heptachlor and heptachlor epoxide, expressed as heptachlor
Hydrogen cyanide	cyanides expressed as hydrogen cyanide

(1) <i>Pesticides</i>	(2) <i>Residues</i>
Hydrogen phosphide	phosphides expressed as hydrogen phosphide
Imazalil	imazalil
Inorganic bromide	determined and expressed as total bromine from all sources
Ioxynil	ioxynil
Iprodione	sum of iprodione and all metabolites containing 3,5-dichloroaniline moiety, expressed as iprodione
Malathion	sum of malathion and malaoxon, expressed as malathion
Mercury compounds	determined as total mercury and expressed as mercury
Methacrifos	methacrifos
Methyl bromide	bromomethane
Mevinphos	sum of <i>cis</i> - and <i>trans</i> -, mevinphos
Omethoate	omethoate (from use of formothion, dimethoate and omethoate)
Parathion	parathion
Parathion-methyl	parathion-methyl
Phosalone	phosalone
Phosphamidon	sum of phosphamidon (E- and Z- isomers) and N-desethylphosphamidon (E- and Z- isomers) expressed as phosphamidon
Pirimiphos-methyl	pirimiphos-methyl
Pyrethrins	sum of pyrethrins I and II, cinerins I and II, jasmolins I and II
Quintozene	sum of quintozene, pentachloroaniline and methyl pentachlorophenyl sulphide expressed as quintozene
Tecnazene	tecnazene
Thiabendazole	thiabendazole
Triazophos	triazophos
Trichlorfon	trichlorfon
2,4,5-T	2,4,5-T
Vinclozolin	sum of vinclozolin and all metabolites containing 3,5-dichloroaniline moiety, expressed as vinclozolin

BEST AVAILABLE DOCUMENT

EXPLANATORY NOTE

(This note is not part of the Regulations)

These Regulations, made under Part III of the Food and Environment Protection Act 1985, specify the maximum levels of pesticide residues which may be left in food. The Regulations, inter alia, implement Council Directives 86/362/EEC and 86/363/EEC of 24th July 1986 on the fixing of maximum levels for pesticide residues in and on cereals, and in and on foodstuffs of animal origin (viz. meat and milk and products derived therefrom) (O.J. No. L221, 7.8.86, pp.37 and 43 respectively).

The foods to which the Regulations apply are listed in Schedules 1 and 2 to the Regulations together with a list of pesticides used in connection therewith. The residues which may result from the use of those pesticides are listed in Schedule 3.

Regulation 3 provides that no person may leave in any food to which the Regulations apply, a level of residue exceeding a maximum residue level applicable to that food.

Regulation 4 enables either of the Ministers to seize or dispose of any food containing a residue level in excess of any maximum residue level, or to require some other person to dispose of that food. They may also direct some other person to take such remedial action as appears to them to be necessary.

In accordance with regulation 5 sampling of food is to be determined by reference to Parts 5 and 6 of the Codex Alimentarius Guide to Codex Recommendations Concerning Pesticide Residues. Copies of these documents are available for inspection at the Library of the Ministry of Agriculture, Fisheries and Food, Whitehall Place, London SW1A 2EY and at the Library of the Scottish Office, New St. Andrew's House, St. James' Square, Edinburgh EH1 3TE.

Offences and penalties for contravention of regulations made under Part III of the Food and Environment Protection Act are prescribed respectively by sections 16(12) and 21(3) of that Act.

The Regulations apply to Great Britain and come into force on 2nd August 1988, with the exception of regulation 3(b) and Schedule 2 which come into force on 31st December 1988.

BEST AVAILABLE DOCUMENT

£2.20p net

ISBN 0 11 087378 5

Reprinted 1988

Printed in the United Kingdom for Her Majesty's Stationery Office
No. W01899 C10 11/88 5100 56219 41923

**SECTION J - PESTICIDE APPLICATION,
PRODUCTS AND MACHINE CALIBRATION**

	<u>Page</u>
1. Introduction	90
2. Choice of product	90
3. Product Concentration	90
4. Calibration	90
5. Water Volummes and Droplet Size	91
6. Safety Precautions	91
7. PESTICIDE AVAILABILITY - SRI LANKA	92
Herbicides	92
Insecticides	93
Fungicides	94

PESTICIDE APPLICATION NOTES

1. Introduction

Pesticides are dangerous if used incorrectly, both to the spray operator and to the end customer of the product. It is essential that the correct pesticide is chosen for the problem in hand, it has to be applied at the correct dosage rate and in the correct water volume. The sprayer must be clean and free from contamination from previous sprays and have the correct nozzle type. The correct spray to harvest intervals must be observed at all times. If these criteria are taken into account each time spraying takes place, there should be no problems occurring from crop damage due poor pesticide application or choice of chemical. and the end crop will be safe to eat, and will meet current pesticide legislation.

2. Choice of Product

On pages 3-5 in this section of the pesticide notes, you will find a list of approved pesticides in Sri Lanka for use on vegetable crops.

Where ever possible choose products that leave little or no surface residues on the crops, the UK Supermarkets will reject crops where residues are seen, even if the correct product and harvest intervals are observed.

3. Product Concentration

It is always important to apply the correct rate of Active Ingredient over a given area. This is usually quoted in litres or kg etc., of product per hectare. The active ingredient rate has to be applied regardless of the water volume. If the water volummes are changed for any reason, the active ingredient rate has to remains the same over a given land area. The product concentration in the water has to changes to accommodate water volume changes.

eg. 1kg per ha in 300 litres of water = 3.3g per litre of water.
1kg per ha in 200 litres of water = 5.0g per litre of water.

Both give the same application rate of 0.1 grams of product per m². This must be borne in mind when calibrating sprayers, see below.

4. Calibration

Each sprayer must be accurate in its application and should be calibrated before spraying commences. A simple way to do this with hand held machines is to calculate the area covered by one litre, and spray this with plain water. Repeat as necessary until the correct walking speed in conjunction with sprayer pressure and nozzle size has been established. If for example 250 litres of water is recommended per hectare, one litre of water covers 40m² and for 300 litres per hectare one litre should cover 33m². To establish the actual application rate of a machine use the following calculation.

- 4.1 Establish the area sprayed in m².
- 4.2 Establish the quantity of water used in litres.
- 4.3 Apply the following equation:

(Volume of Water x 10,000)/area sprayed.

eg. Area = 90m² - Water Volume = 2.5 litres

Application Rate = 278 litres per hectare. $(2.5 \times 10000) / 278$

5. Water Volumes and Droplet Size

Always choose a water volume that is suitable for the control of the pest or target disease. High volume sprays lead to run off from leaves etc. and are often not suitable for the control of the common pests and disease. On the other hand a very low volume of water will not give complete coverage of the plant and control of pests and diseases may be poor. Products that are systemic in their action can often be applied at a lower water volume than those that rely on contact action. The product label will usually give a guide to water rates along with dilution rates.

The nozzle used is also important, there are various types which give different spray patterns. For general spraying of plants a cone nozzle will generally give the correct coverage on the plant. Fan nozzles are more suited for spraying herbicides or other soil applied pesticides. Make sure the nozzles used are in good condition and give an even application over the sprayed area. When cleaning nozzles to not use pins or other sharp instruments as these damage to aperture and change the spray pattern. This can lead to over or under dosing of pesticides.

6. Safety Precautions

When spraying remember the following points:

- 6.1 Read the product label and check you are using the correct chemical.
- 6.2 Do not over dose pesticides
- 6.3 Always choose the safest product where you have a choice.
- 6.4 Only spray if the weather conditions are suitable.
- 6.5 Wear the correct protective clothing, never handle sprays without rubber gloves.
- 6.6 Dispose used containers in a safe place where they cannot contaminate other crops animals or waterways.
- 6.7 Do not allow pesticides to contaminate water sources.
- 6.8 Wash equipment and clothing after spraying with clean water and detergents.
- 6.9 Always add concentrates to the water and mix thoroughly before spraying.
- 6.10 Keep sprays agitated in the sprayer to avoid under and over dosing.
- 6.11 Take care when filling tanks, beware of back siphoning and over filling.
- 6.12 Do not smoke, eat, during or handle foods whilst spraying, **WASH HANDS.**
- 6.13 Put back into store all surplus pesticides in their original container.
- 6.14 Wash off immediately any concentrate that comes into contact with skin.

7. PESTICIDE AVAILABILITY - SRI LANKA

The following chemicals are recommended for use in fruits and vegetables in Sri Lanka. This is not necessarily the full list available, but from this selection most pest and disease problems should be controlled. If used correctly, these products should not give rise to residue problems in the harvested crops. The minimum spray to harvest intervals are indicated for insecticides and fungicides.

7.1 Herbicides

Herbicide	Common Name	Company	Target Weeds	Comments
Gramoxone	Paraquat	Harcros	Non Systemic Total Control	
Gramoxone	Paraquat	Baur	As Above	
Counter	Glyphosate	Harcros	Systemic Total Control	
Glycel	Glyphosate	Baur	As Above	
Boursate 36	Glyphosate 36%	Baur	As Above	
Sencor WP 75%	Metribuzin	Haychem Bayer	Selective Potatoes	
Direx 4L	Diuron Flowable	Anglo Chem	Residual Total Control	
Diuron WP 80%	Diuron	Haychem	As Above	
Diuron WP 80%	Diuron	Haychem	As Above	
Diuron WP 80%	Diuron	Harcros	As Above	
Tri-allate	Avadex		Grass weeds Mange Tout	
Trifluralin	Treflan		Weed Control Beans	

7.2 Insecticides

Insecticide	Common Name	Company	Target Pests	Harvest Intervals
Demro	Dimethoate	Harcros	Aphids	7 Days
Dimitox 40	Dimethoate	Anglo Chem	Aphids	7 Days
Metasystox -R EC25%	Oxydemeton -Methyl	Bayer Hortichem	Aphids	21 days
Basudin 50 EC	Diazinon	Harcros	Soil Pest, Thrips/Aphids	14 days
Harcron	Chlor-pyriphos	Harcros	Soil Pests	21 Days
Lorsban 40 EC.	Chlor-pyriphos	Anglo-Chem	Soil Pests	21 Days
Pyrinex 20 EC.	Chlo-pyriphos	Anglo-Chem	Soil Pests	21 days
Baythroid	Cyfluthrin	Bayer	Caterpillars Pea Month Pea Weevil	1 Day
Ambush EC 25	Permethrin	C.I.C.	Caterpillars Leaf minor etc.	1 Day
Dipterex LC 50%	Trichlor-fon.	Haychem	Caterpillars Cutworms	2 Days
Harfurdan	Carbofuran	Harcros	Soil Pests Nematodes	28 Days

7.3 Fungicides

Fungicide	Common Name	Company	Target Diseases	Comments
Harcozeb	Mancozeb	Harcros	Mildew/Rusts	14 days
Propercol	Mancozeb	Anglo-chem	Mildew/Rusts	14 Days
Vondozeb	Mancozeb	Baur	Mildew/Rusts	14 days
Ridomol MZ WP	Metalaxyl + Mancozeb	Harcros	Downy Mildew	21 Days
Manex 4L	Maneb	Anglo Chem	Rusts	14 Days
Benor	Benomyl	Harcros	Botrytis P. Mildew	12 Days M/T 3 Days Beans
Thiovit	Sulphur 80%	Baur	P. Mildew	2 Days
Sulphur WP 80%	Sulphur	Haychem	P. Mildew	2 Days
Captan WP 50%	Captan	Baur	Scab	7 Days
Plantvax	Oxycarboxin	Anglo Chem	Rusts	21 Days
Blast-all	Carbendazim	Anglo Chem	Anthraco-nose Botrytis	7 Days
Baycor EC 300	Triadimefon	Haychem	Rusts	14 days
Lonacol	Zineb	Haychem	Rusts	7 days

INSECTICIDE AND HERBICIDE APPLICATION TECHNIQUES

SPRAYS & SPRAYING

Some of the principles to be adopted in the control of weeds, insect pests and plant pathogens have been touched upon. In all cases, but primarily in weed control, the use of sprays is one of the major methods. This chapter discusses some of the techniques, equipment and formulations which may be encountered in the course of spraying.

Spray Equipment. A wide range of spraying equipment is now available, from the small flit sprayer to large power-operated sprayers with capacities of up to 1800 litres.

The flit sprayer, which holds about a cupful of mixture, is adequate for most small gardens. It should always be thoroughly washed and dried after use, the container and pump shaft being kept apart to minimize corrosion in storage.

The knapsack sprayer, which is one of the most successful all-purpose sprayers, used worldwide, consists of a tank of up to 23 litres capacity and a pump, strapped on the back of the operator. A lever provides compression and in some cases operates a stirrer in the tank. A lance is connected to the spray-tank by a flexible hose. Problems with metal corrosion have now been partly resolved by the use of plastics. These machines are satisfactory in that they are robust, versatile and portable. They are very widely used in all forms of tropical agriculture where labour costs are not prohibitive.

Power-operated sprayers come in a variety of different sizes, from smaller than knapsack size to large tractor-driven machines. Since there are many more parts which can go wrong, portable power-operated sprayers being heavier than manually-operated machines, and the initial costs substantially higher, use of these machines is generally restricted to large-scale operations using tractors with spray booms of 6—9 m or more. Included in this category are fogging machines, which produce a dense fog of fine droplets, in which the pesticide is dissolved. Mist-blowers may be converted to dusting machines to supply powder by using a long vinyl tube with a series of holes in it. Dust is blown through this, and thus distributed.



Knapsack sprayer operator wearing protective clothing.

Aerial spraying is generally used only on large areas where swift application of insecticide is imperative, and the greatly increased additional cost can be afforded.

Filters & Nozzles. Since most formulations are mixed in the field, it is particularly important to filter the spray, and ensure that no foreign matter gets as far as the nozzles, which may thus be blocked. The nozzles themselves are of particular importance, since it is they which break

or a solid cone. The size of the apertures and rates of delivery can be regulated by fitting different nozzles which are available with the better-known sprays.

Fan nozzles are best used to cover the ground at a uniform speed to give an even distribution over the whole width of the swathe. Hollow-cone nozzles give little or no deposit in the centre of the cone, while solid cone nozzles give the heaviest deposition in the centre of the circle, and are regarded as the best for spot-spraying. Twin nozzles are not recommended on knapsack sprayers, except if blanket spraying is required.

Volume of Spray Mixture & Droplet Size. Normal high-volume spraying rates vary from 200 to 450 litres of mixture per hectare, though rates in excess of 2000 litres per hectare are occasionally used. Low-volume rates vary, from up to 75 litres per hectare for aerial application, to up to 200 litres per hectare for land application. Ultra-low volume (u.l.v.) spraying involves the production of very small droplets carried in a light oil and blown by a fan. In general, the smaller the droplet size, the more evenly will the chemical be spread. However, droplets of less than 30 microns are all but airborne, giving rise to drift problems. Since smaller droplets have larger surface areas, and thus evaporate more easily, u.l.v. formulations must not use water, which would evaporate too quickly. A number of suitable solvents have been developed in recent years.

Spray Additives. These are of two kinds. Wetters, or surfactants, are substances added to the spray to reduce the surface tension of the droplets, and thus improve the contact between the spray and the surface. They sometimes also improve the solubility of certain herbicides. Stickers, the second additive, are substances assisting the spray to adhere. Most modern herbicides and insecticides already have stickers added, but an additional sticker may be needed in cases where the leaf surface is particularly waxy. Surfactants, of which there are a number of brands on the market, are generally applied at the rate of 30 ml per 100 litres, while stickers are usually applied at 120 ml per 100 litres.

Calibration of sprays is necessary to ensure that the correct dosage rates are applied. The simplest way is probably to spray a typical section of the area for weed control with the standard techniques employed and the usual pump pressure, walking speed and nozzle to be used. Compute the actual area sprayed in square metres, and measure the amount of spray solution used.

E.g. area sprayed 70 m², using 2.6 litres of spray solution (or water, for trial):

Then volume of spray pump output per hectare is

$$\frac{2.6 \times 10,000}{70} = 371.4, \text{ say } 371 \text{ litres per ha.}$$

Assume required dosage is 2.82 litres of chemical per ha.

$$\frac{2.82}{371} = 0.76\% = \text{required concentration of chemical solution.}$$

For an 18 litre spray pump, add 0.76% × 18 litres
= 137 cc of chemical,

Safety Precautions. Many herbicides and pesticides are extremely toxic to animals and humans. Considerable care is therefore necessary in their use. The main points to be remembered are:

- (i) Read the label, particularly the safety precautions, before use.
- (ii) Do not exceed recommended dosages.
- (iii) If a safer formulation is available, use it in preference to a more toxic one.
- (iv) Avoid spraying in windy weather when there is an enhanced danger of drift.
- (v) Avoid all contamination of water sources, and in particular ensure that empty containers are washed out and the washings incorporated in the spray mix. Do not use empty containers for any other purpose, but dispose of these safely.
- (vi) Do not allow any of the spray mixture to come into contact with the body. For this purpose long-sleeved shirts, long trousers, rubber boots, rubber gloves, a respirator and eye protection should be worn by all sprayers.
- (vii) Return all surplus material to a locked store after use.
- (viii) Clean all clothing used with detergents and wash the body with soap on completion of the job.
- (ix) Never use mouth suction to draw liquids into a siphon.
- (x) Have all the necessary containers, siphons and measuring equipment ready before containers are opened.
- (xi) When filling a tank by hose, beware of back-siphoning, which occurs when one end of the hose is lower than the liquid level in the tank.
- (xii) Thoroughly clean all apparatus after use. Rinse containers 3 times, draining for 30 seconds after each rinse, and pour water away safely, not into streams.
- (xiii) Do not smoke, eat, drink or handle food, cigarettes, etc., whilst spraying, but wait until the job is completed and after washing the body

MED/EIED PUBLICATIONS AVAILABLE

Local Market for Pickled Products (December 1990)

Non Farm Small Scale Enterprise Credit on Selected Mahaweli Systems, Geoffrey Peters and M.W. Panditha (December 1990)

Crop Profiles - Spices, Herbs and Aromatics, L. Denzil Phillips (July 1991)

Study of the Tourism Development in the Uda Walawe (July 1991)

Potential for Silver Skin Onions in the Mahaweli, Walter Nueberg (August 1991)

Nursery Development of Papaya and Mango, Papaya Growers' Guide and Technical Notes for Business Plan for Mixed Fruit Cultivation Investment, Ben Hatfield (November 1991)

Dehydrated Fruit Processing Opportunities and Trends in Sri Lanka, Wanchai Somchit, (November 1991)

An Evaluation of the Entrepreneur Development Programmes, Dr. Susan Exo and Hina Shah, (December 1991)

Aromatics PIP Interim Report on Trials Establishment, Dr Thomas Davies (December 1991)

Agro-Business Financing Review, Dennis De Santis (December 1991)

Integrated Fruit Drying, juicing, Pulping project - Prep Feasibility Study, Michael Smedley, Ben Hatfield and Wanchai Somchit (December 1991)

Cold Chain Requirements for Uda Walawe, Fredrick E. Henry (March 1992)

Field Manual for Processing Tomatoes, Peter Florance (March 1992)

Processing Tomato Trials in Mahaweli System H, Peter Florance (March 1992)

Processing Tomato Trials in Mahaweli System C, Peter Florance (March 1992)

Dried Fruit Processing in the Mahaweli, Dr. Kamal Hyder (September 1992)

Feasibility Study on Commercial Potential of Snake Venoms in Mahaweli Systems, Anslem de Silva, (January 1993)

Census of Mahaweli Enterprises and Employment (January 1993)

Most publications are priced at Rs.100/-. The publications are available at the MED Office at 8th Floor, Unity Plaza, Colombo 4. (inquiries, Ph. 508682-4)

An EIED publication entitled - "Information Available for the Mahaweli Investor", is also available at the MED Office.

MAHAWELI BUSINESS CENTRES

iddehiya Road
Anukolapelessa
047-28234

ent Project Manager's Office
Emuna
066-6601
066-6601

ent Project Manager's Office
Attakandiya
027-2332
027-2353

ent Project Manager's Office
Ipitiya
047-30013
047-30013

Mawatha
Mawatha
025-9515
025-9515

Block Office
Durukotte
055-7316

ent Project Manager's Office
Dehiat Takandiya
0542-205
0542-205

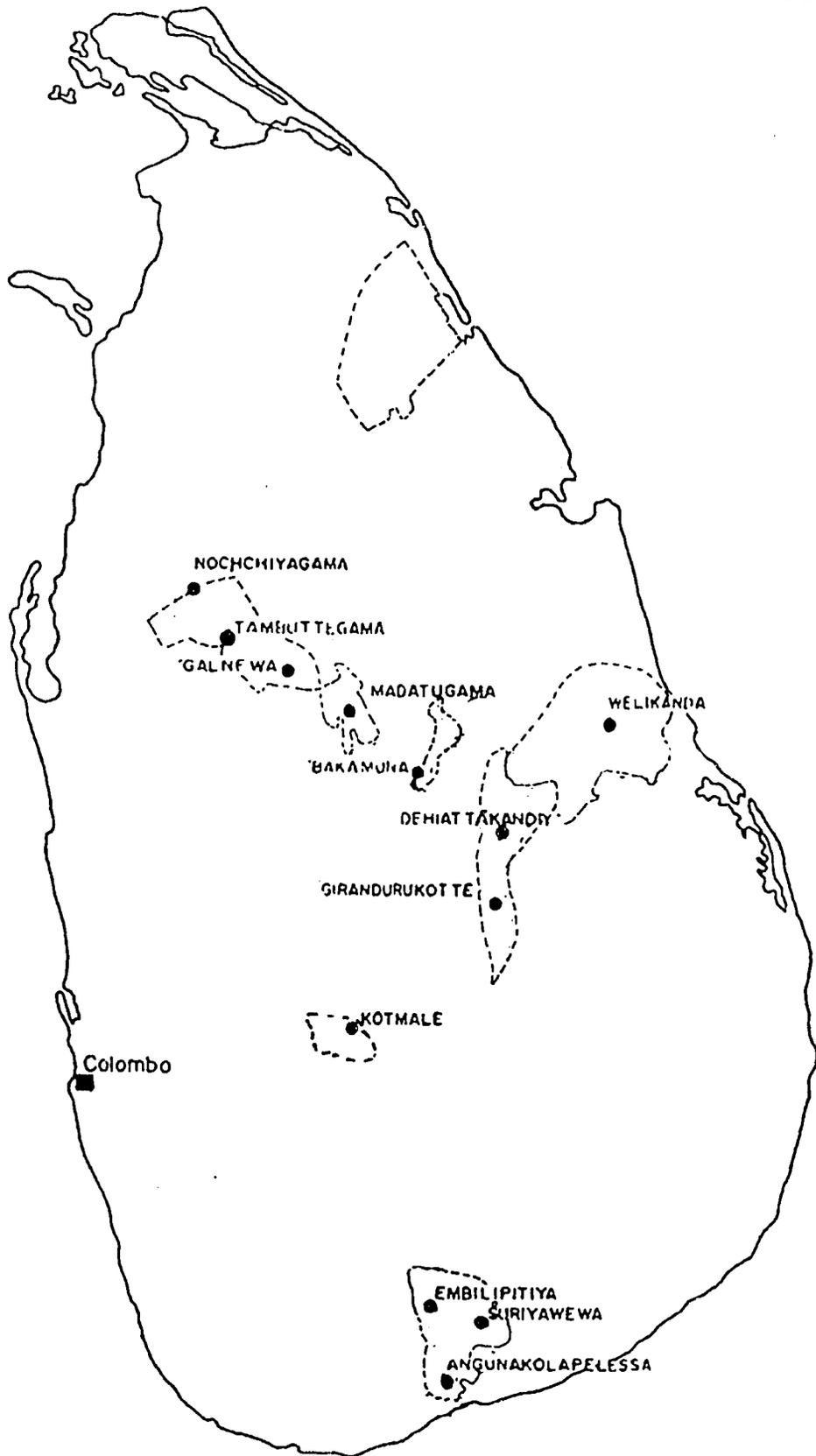
agala Road
Madatugama
025-4244
025-4244

lam Road
Nuchhiyagama
025-7821
025-7821

an Building
Walantota Road
Suriyawewa

dept Project Manager's Office
Ibuteegama
025-6354
025-6354

ent Project Manager's Office
Kandana
027-2065



MAHAWELI BUSINESS CENTRES OPERATED BY EIED/MED PROVIDE TECHNOLOGY, FINANCIAL, PLANNING, TRAINING AND BUSINESS SERVICES (FAXES, SECRETARIAL, COPYING) TO ENTREPRENEURS IN AGRIBUSINESS, MANUFACTURING, TOURISM, MINERALS AND HOUSING DEVELOPMENT.

MAHAWELI PROJECTS

RECT AVAILABLE DOCUMENTS