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16911

DP/ID/SER.A/1054
13 July 1988
ENGLISH

REGIONAL NETWORK ON PESTICIDES
FOR ASIA AND THE PACIFIC

DP/RAS/85/023

INDONESIA

Technical report: Packaging of pesticide formulation

Prepared for the Government of Indonesia
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

Based on the work of B. N. Chatterjee, consultant in packaging of pesticide formulation

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United Nations Industrial Development Organization
Vienna

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V.88-26878

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1. INTRODUCTION

Due to importance and complexities involved in the manufacture and use of pesticides worldwide and with special emphasis to greater and safer use of pesticides in the developing Countries, UNDP has advocated a regional approach by Developing Countries to understand, discuss and exchange of views on production, marketing and control of use of pesticides for Asia and the Pacific region. The first phase of the project has been completed and the second phase is in progress. Among the various topics covered in the project, pesticides packaging has been chosen as one of the topics for providing assistance to the region. Indonesia as its priority has requested UNIDO to provide advice on the various requirements for proper use of container for Liquid and Solid formulations both at the production and user end.

Based on the request of the Government of Indonesia to UNIDO, India offered the service of a Consultant to undertake a mission of one month in Indonesia to provide the technical assistance in the field of packaging and handling of pesticides.

Terms of reference of the Consultant are as follows:

The Consultant in association with the National Co-ordinator of the project is expected to discuss and advise on:

a. The various requirements of packaging of pesticides formulation.

b. The type of containers available and their suitability for pesticides filling, storage, distribution and use.

c. The use of local raw-materials for packaging liquid/solid.

d. The proper disposal of empty un-used and partly used pesticides containers.

e. The various test needed (including demonstration) for testing the suitability of packaging materials.

f. The Expert is expected to submit a report on his findings and recommendations.

Since no briefing/debriefing in Vienna was required, Consultant arrived on 2nd March, 1988 at Jakarta. the duty Station in Indonesia.

In order to obtain the necessary information and to understand the present position about the packaging of pesticides, the Consultant had detailed discussions with the various officials connected with pesticides sales, distribution etc. made visits to the Govt. warehouse, manufacturer of pesticides, the manufacturer of Tin Containers, retail shops. After visiting above places, lecture and technical discussion was held on different topics amongst about 30 participants drawn from Pesticides Industry, Packaging Manufacturer, different Govt. departments etc.

After having visits and discussion on various technical matters pertaining to Pesticides Packaging, the Consultant has prepared this report including the findings and recommendations as desired.

2. CURRENT STATUS OF PESTICIDE USE

Agricultural sector plays a vital role in national economy of Indonesia. Accordingly Government of Indonesia put in Agricultural sector on the highest priority in their five year Development plan, (REPELITA). This has resulted in dramatic increase in food production and country has become self sufficient in food grain production and also started exporting rice to other countries. At present Govt. is putting its all out effort to boost further the agricultural productivity through out the country.

One link in this scheme is the distribution of number of key pesticides to farmers at a subsidized price through agricultural intensification programme (BIMAS and INMAS) and special intensification programme (INSUS). It has been observed that during the period of 1979-80 to 1984-1985; the subsidized pesticides demand increased at the average of 39% per year.

To meet the growing demand of pesticide, the pesticides industries in Indonesia were also developed. At present there are three manufacturing industries with total

capacity of 5,400 M.T. per year. The largest manufacturing Company is PT. Petrosida Gresik (Govt. Company) which produces 2,500 MT Diazinon, 700 MT MIPC and 1,350 MT BPMC per year. The other technical grade pesticies produced in Indonesia are Ethepan and Monocrotophos with rated capacity of 100 MT and 750 MT per year respectively.

In pesticides formulation units at present not less than 120 types of pesticides are being produced in Indonesia. Insecticides are the most effective group of pesticides. It is estimated that about 80% of the pesticides domestically made are insecticides whereas the other 20 percent are herbicides, fungicides, rodenticides and other sort of pesticides.

It has been observed that Formulated Pesticides production in 1974 was just 340 MT/KL whereas in 1984, the production increased to 46,016 MT/KL which includes liquid, powder/dust and granular formulation. Granular formulation indicate significant increase since 1980. Rated capacity of granular formulation was 54% of the total capacity of other formulations in the year 1986. Although granular products usually are formulated with low concentration of active ingredients, pesticides authorities in Indonesia are in favour of recommending granular formulation wherever possible.

It is reported that at present total formulation capacity of different formulators in the country is 130, 400

MT/KL per year and Govt. purchased about 53,511 MT/KL of formulated pesticides from manufacturer for distribution to the farmer under subsidized programme.

In general, formulation produced in Indonesia are Emulsifiable Concentrate, Wettable Powder, Granular, Water Soluble Concentrate, Dust, ULV, and Wax Block.

The Indonesian market for pesticides consist of two sectors. The Government subsidized food crop sector and the non-subsidized free market sector comprising estate crop plantations, household and other pesticides users.

Government subsidized pesticide users are the farmers who participate in the Indonesia "BIMAS/INMAS" programmes for the intensified cultivation of rice, secondary food crops and vegetables. Subsidized pesticides have also been extended to farmers who participate in the industrial crop intensification programme for cotton, fibre, sugarcane and tobacco.

PT. Pertani, a Government Corporation was designated by the Government in 1978 as the sole distributor for subsidized pesticides and has taken over from the formulators the marketing of subsidized pesticides to various retail outlets all over the country.

3. Lecture and Discussion

The National Co-ordinator of the Project in Consultation with the Consultant prepared a programme for the aboveon the following topics.

1) Lecture and Discussion on Technical Specification on Packaging for Pesticides Formulation.
2) Lecture and discussion on role of Pesticides Packaging on Transportation, Storage and Handling.
3) Lecture and Discussion on Laboratory equipment required for evaluating Pesticides Packaging.
4) Lecture and Discussion on Pesticides Packaging as part of the registration requirements including role of labels.
5) Lecture and Discussion on Disposal of Empty Package.

About 30 participants drawn from different organizations including government department, participated in the programme. The details of these participants are indicated in Annex 1.

Consultant prepared a paper on each topic and distributed before hand amongst participants to facilitate the discussion; the abstract of which are attached as annex 3.

4. Visits and Observations

Consultant along with Government Officials visited the following places.

4.1 Pesticides Ware House - P.T. Pertani, Bogor

This is a Government ware-house where different pesticides are stored for distribution to other retailers dealers, etc. They get these materials directly from the formulators. Mainly insecticides are stored in the godown. But other pesticides are also stored in the same place. Storage shed was not in good condition. Liquid and Solid formulations are stored together in the same warehouse. Proper storage godown should have been constructed to keep different types of pesticides separately. General guide lines regarding store requirements have been spelled out in the consultant's paper "Role of Pesticides Packaging on Transportation, Storage & Handling". There is no adequate system of checking the quality of the pesticides purchased from the formulators. Since the Government is purchasing the pesticides directly from the formulators, a system of checking the quality as well as quantity is a must. The same inspector should check the quality of packing, mode of transportation etc, so that the retailers get the pesticides in good condition as produced by the manufacturers.

4.2 Retailers Shop at Bogor and Cipanas

Some retailers are selling pesticides along with other agrochemical from the same shop. It was also observed that they sell the pesticides in loose form. Some tin containers were found leaking from the neck. Loose sale should be stopped forthwith. A proper check is must for ensuring correct method of storing and selling of the pesticides in retailers end. Plant protection department may seriously think about the implementation of the pesticides act for this matter.

4.3 P.T. ICI Pesticide

This was multinational pesticides Company located at Bogor. They are producing more than 20 pesticides in the plant. Apart from insecticides, they produce herbicides, fungicides, rodenticides etc. They were having modern formulation plant and the quality of packaging was quite satisfactory. They are using small quantity of the glass bottle containers at present, but they are likely to replace by some other containers as glass bottles are prone to breakage in transit. They have got the installed capacity of 10,000 MT/KL per year.

4.4 P.T. Bayer Indonesia

This is largest formulation plant in Indonesia. This is multinational pesticides Company manufacturing

different types of pesticides required for plant protection. They also manufacture house-hold pesticides, aerosol spray etc. Installed capacity of the plant is 23,000 MT/KL per year. Government purchased from them during 1987 about 8,896 MT/KL pesticides. They manufacture good quantity of granular pesticides. They are having quite sophisticated plant with good system of filling, packaging etc. They are using tin containers, HDPE bottles, polythene bags, Aluminium containers for Aerosol. They are quite forward looking management, trying to improve upon the packaging based on the experience and knowledge drawn from parent Company. In recent past they have improved the design of rectangular tin container by introducing 'Flex-Spout', made of plastic in place of projected neck which will be quite safe in handling the containers. As reported, they do not have any packaging problem as such.

4.5 United Can Company

This is a large tinplate containers manufacturing company in Indonesia. They are manufacturing different size and shapes of tin containers as per market demand. Their plant is quite modern and automatic. They are capable of producing tin containers for pesticides, as designed by formulators, in quite short time. At present they are catering the need of pesticides market to the extent of 40% which is only 6% of their turn over. They are using

indigenously available tin sheet for manufacturing the containers. Quality of containers and printing on it is quite good. They are using separate neck for bigger size rectangular container instead of integrated neck on the top. In case of separate neck, since the same is welded on top portion of the Can, it is prone to leakage. However, as reported, they do not have any complaints about the leakage from the weld. Consultant suggested for integrated neck.

4.6 POP Can Industry

This is also a can manufacturing company. This is a smaller company as compared to United Can Company. They have got the good plant for manufacturing can as required by pesticides formulators.

5. Findings

1) Aluminium Containers are not used in Packing Pesticides.
2) Almost all packaging materials are available in the country. Tin plate containers, HDPE Containers, Corrugated box, Paper boxes, Cartons, Polythene bags are available locally.
3) Generally, no leaflets are distributed for the benefit of users.
4) Glass bottles are used in packing liquid pesticides.

5) System of Checking quality, quantity of pesticides and quality of packings in formulator's factory is not adequate.

6) No Standardization of packing material for different pesticide filling as done in other Countries by standard institution.

7) Powder/Granular formulations are filled in Polythene bags and packed in paper cartons generally. As reported, there is no complaint from users.

8) Tin Containers with screwed neck sealed by Pilfer Proof (P.P.) Cap is not absolutely leak proof.

6. Recommendations

6.1 Standard Institution should form a "Pesticide Packaging Committee", drawing members from Pesticides Industries, Packaging Industry and from different Govt. Agencies for the purpose of Standardization of different packing materials used for different pesticides in the country.

6.2 Glass containers for packing liquid pesticides should be dis-continued as they are prone to breakage while transporting.

6.3 Pesticide Packaging Committee would give the detail specification of various types of containers, used by the formulators particulary for Govt. purchase pesticides.

6.4 Pesticide Packaging Committee, so formed would explore the possibilities for more use of containers made of plastic material and Aluminium for safe handling.

6.5 Pesticide Packaging manufacturer as well as formulators should have quality Control Laboratory equipped with instrument to ensure quality packaging.

6.6 Checking system should be improved to check the quality, quantity of pesticides filled in container, the quality of packings, mode of transportation at formulator's premises so as to ensure that the formulators produce the quality pesticides, use specified packings as laid down by the Pesticide Packaging Committee particularly for Govt. purchase pesticides.

6.7 Loose sale of Pesticides by shopkeepers is to be stopped forthwith.

6.8 Outer corrugated box packages should be wrapped with polythene sheet adequately so that corrugated boxes are not damaged due to rain while transporting by Road/Sea etc.

6.9 May consider introducing regular system of supplying leaflets to users.

6.10 Appropriate size of the packings should be recommended by the pesticide Packaging Committee so that loose sale is stopped by the retailer and user's requirements are met.

6.11 PVC plug may be tried in tin container, HDPE bottles and Aluminium containers to make these containers leakproof, apart from using P.P Cap for sealing the neck of the container.

6.12 HDPE bottles, Aluminium containers shall be wrapped individually in transparant Polyethylene bags which shall be closed by heat sealing. This will be helpful to save the label and also will give better look to the container.

6.13 For safe transporting of pesticides by road, the driver should be trained to deal with Road Emergencies. Supplying the documents like TREM card to Driver will be useful in this aspect.

6.14 Testing of transport packaging may be introduced if found necessary.

7. Acknowledgement

The Consultant is greatly indebted to the persons listed in the Annex 2 who helped him in completing the mission by providing with facilities, advice and information. However, he will fail in his duties if a

specific mention of few who have been responsible to make his stay in Jakarta comfortable and helped immensely in getting the relevant information. They include Mr. Djumarman, Mr. Trisnanto, Mr. M.R. Malhotra, Mr. Ram Narain, Asstt. Resident Representative of UNDP and Mr. Handoke, Senior Programme Assistant UNDP and last but not least the staff of Mr. Djumarman and his driver.

Annex 1

LIST OF PARTICIPANTS

S.NO.	NAME	ORGANIZATION
1.	Purwoko	PT. Petrokimia Kayaku
2.	Muljono	PT. Petrokimia Gresik
3.	Syaiful Bachri	PT. Petrosida Gresik
4.	Taufiq Soeriawidjaya	PT. Inkita Makmur
5.	Dittee Ediati	PT. Dharma Niaga
6.	Rasmi Widyani	Agency for Industrial R&D
7.	Emiliana	PT. Harina
8.	Ani Isnawati	Centre for R&D of Pharmacy
9.	Pudji Lastari	Ministry of Health
10.	Siti Sunnarsi	Ministry of Trade
11.	Soelasto	PT. United Can Company
12.	Komarudin	PT. Agrocarb
13.	Maman Rachman	PT. Sarmika Nusantara Sakti
14.	Suyono	Ministry of Agriculture
15.	Komarudin	PT. Agrocarb
16.	Moch. Darmoke	Pertamina, PDN
17.	R.S. Batubara	PT. Agrocarb
18.	Sutripriaso	Pesticide Committee
19.	Mulyadi	Pesticide Committee
20.	Marjony H. Mukadis	Ministry of Health
21.	S. Wiedodo	PT. Kartini PAI
22.	Cosmas TH	PT. United Can Company

23.	Syaiful B	PT. Petrosida Gresik
24.	Kemaladewi	PT. Maskitani
25.	Sulaiman	PT. Bayer Indonesia
26.	Yaman	PT. Popular Can
27.	Agus Wahyudi	Ministry of Industry
28.	E. Hatta S.	Ministry of Industry
29.	Susilowati	Instt. for R&D Chem. Indust.
30.	Sri Pudji Rahyu	Instt. for R&D Chem. Indust.
31.	Emmy Ratnawati	Instt. for R&D Chem. Indust.

Annex 2

LIST OF PERSONS WHO HELPED THE CONSULTANT IN COMPLETING HIS MISSION

S.NO.	NAME	ORGANIZATION
1.	Dr. R.B. Suhartono	Head, Agency for Industrial Research and Development as National Co-ordinator of the Project (RAS/85/023)
2.	Mr J. Kusnadi	Head, Institute for Research and Development of Chemical Industry (IRDCI)
3.	Mr. Djumarman	Head, Div. for Research of Fertilizers and Petrochemicals, IRDCI
4.	Mr. Trishanto	Staff of IRDCI
5.	Mrs. Rahayu Susilowati	Staff of IRDCI
6.	Mrs. Sri A. Suryosunrko	Director, Agrochemical Indust.
7.	Mr. Haryati	Directorate of Agrochemical Industry.
8.	Mr. Agus Wahyudi	Directorate of Agrochemical Industry
9.	Mr. Hatta	Directorate of Agrochemical Industry
10.	Mr. Mulyani Sukardi	Secretary of Pesticide Committee
11.	Mr. Mulyadi Banteng	Staff of Pesticide Committee
12.	Mr. Erick F. Djohan	Asociation of Pesticide Indistry.

Annex 3

Lecture and Discussion on

TECHNICAL SPECIFICATIONS ON PACKAGING FOR PESTICIDES FORMULATION

The Chemical/Pesticides we pack have varying properties. One essential prerequisite is that there be no - interaction between packaging material and contents. The necessary information can only be obtained by carefully implemented tests within the framework of long - term experiments, possibly under accelerated conditions. It goes without saying that product (contents) and packaging material are monitored analytically.

The pack size, design, closure concept, transport and storage, disposal are the main requirements for the packing materials of different Pesticides formulation for safety point of view.

It is advantageous to distinguish between packaging materials and Pack specifications. The former describe the packaging materials, whereas the later contains working instruction for the refilling plant, describing all packaging material in details, from the Primary Packaging materials to the Transport Packaging. The packaging material should be tested within the framework of random check based on the laws of statistics. The final inspection

must be carried out to check the ready-made packs before shipping or at central stores before delivery to dealers.

Packaging means the container together with the protective wrapping used to carry pesticides product via wholesale or retail distribution to users.

The Packaging is divided in three main parts:

1. Primary Packaging

   Containers with Polythene Bags

2. Secondary Packaging

   Craft Fibre Board (CFB) Boxes (10 of one litre, 20 of 500 ml. and 40 of 250 ml. bottles).

3. Transport Packaging

   Wooden cases (1 CFB each of 10 x 1 litre, 20 x 500 ml. and 40 x 250 ml. bottles).

Specification of Bags for Packing formulated D.D.T. (Double Hessian Bags for Pesticides).

1. <u>Basic Cloth</u>

   a) Outer layer

      298 gms/m hessian conforming to IS 2818 (Part V) 1974 specification for Indian Hessian : Part V 298 gm/m at 16% contract regain.

b) Inner layer

270 gm/m hessian conforming to type II of IS. 2818 (Part III) 1971 specification for Indian Hessian : Part III 213 and 270 gm/m at 14% contract regain.

c) Bitumen

Bitumen shall preferably conforming to grade 90/15 of IS 702-1961 specification for Industrial Bitumen (Revised). Bitumen used in the Kraft paper should withstand temperature upto 45 ^{0}C and should not melt or OOZ out from the hessian.

These bags will be interlined with 70 gm/m^{2} of Kraft paper bounded with 100 gm/m^{2} bitumen from both the sides.

2. Size

The bags will have size of 991 mm x 711 mm with capacity of approx. 80 litre when packed with 50 kgs. DDT w.d.p. (50%). All the material used in making bags should be new and of 'A' grade quality.

Specifications of Tin Containers and Corrugated Boxes for packaging Butachlor - 50 EC.

A. **Container**

Rectangular tin container inside coated with suitably pesticide grade lacquer and printed in four colours (as per design and colour transparancy) alongwith PVC Plug and printed aluminium P.P. Cap with integrated neck of 38 mm dia.

5 litre capacity (with handle) Approx weight 425 gram (31/32 SWG)

1 litre capacity (without handle) Appex weight 150 gram (31/32 SWG)

B. **Corrugated Box**

Seven ply corrugated boxes made from 100 GSM kraft paper with top and bottom sheets and partitions duly printed out side in single colour as per design.

To pack 10 x 1 litre capacity tins in two rows of 5 nos. each

Appox sixe - L - 360 mm x B - 260 mm x H -220 mm.

To pack 2 x 5 litre capacity tin.

Appox size - L - 240 mm x B - 185 mm x H - 340 mm.

Specification for Aluminium Containers for Packaging Cypermethrin - EC

Round Aluminium containers (made from 99.9% pure) with narrow knurled and threaded neck, PVC plug fitted with nylon washer; Aluminium tear off seal duly emboseed with company logo. Duly screen printed outside as per design in four colours; or to put P.V.C. stickers on plain bottles.

a)	100 ml. capacity	28 mm dia neck
b)	250 ml. capacity	
c)	500 ml. capacity	32 mm dia neck
d)	1000 ml. capacity	

Specification of HDPE containers for packing Monocrotophos.

HDPE Containers made from fresh 'A' grade granules in Milky white colour and Screen printed outside as per design alongwith PVC plug threaded neck with locking arrangement and P.P. cap duly embossed with logo.

a) 250 ml. cap round container with 25 mm dia neck

b) 500 ml. cap round container with 25 mm dia neck

c) 1000 ml cap round container with 25 mm dia neck

d) 5000 ml. cap Jerry cans with handle and 38 mm dia neck.

Lecture and discussion

on

ROLE OF PESTICIDES PACKAGING ON TRANSPORTATION STORAGE AND HANDLING

The transportation of pesticides needs to be regulated in order to prevent accidents to persons or damage to transport vehicles/vessels or to other goods. There appears to be little justification for treating pesticides differently from other toxic chemicals although most transport codes currently list pesticide separately. Although many siutable packages have been produced but very often we can come-across the problem of leaking in transportation. Not only the transportation, its storage is also a problem. The following guidelines may be observed:

1. Packages containing pesticides, offered for movement by rail, shall be packed in accordance with the conditions specified in the Red Tariff, Ministry of Railways.
2. No pesticides should be transported or stored in a way as to come in contact with food stuffs or animal feeds.
3. No food stuffs which got mixed up with pesticides as a result of any damage to the packages

containing pesticides during transport or storage should be released to the consignee unless it has been examined for possible contamination by competent authorities as may be notified by the authority.

4. If any pesticide is found to have leaked out in transport or storage, it shall be the responsibility of the transport agency or the storage owner to take such measures urgently to prevent poisoning and pollution of soil or water, if any.

5. In no case hooks should be used on the bags/containers/packages of Pesticides as Spillage occur resulting in contamination.

6. The rooms or premises meant for storing pesticides should be well built, dry, illuminated and ventilated and of sufficient dimensions. Moreover, the packages containing pesticides should be stored in separate rooms or premises under lock and key and should be kept away from the reach of the Children.

7. Pesticides should be handled in leak and moisture proof bags properly stitched and prepared to facilitate the lifting or in drums properly sealed.

8. The pesticides should be handled with great care using eye - shield and respirators, if necessary.

More over, it should be noted that there is least amount of oil and/or grease on the head and body of the Operator.

9. All stock of the pesticides should be clearly marked with word "Poison"/"Danger".

10. The pesticides packages/containers should be disposed off carefully; burnt away from habital underground. Every effort should be made to lessen the environmental pollution. It should not be thrown in ponds/streams as it may be harmful to live stock and fish etc. in ponds/streams.

11. Keep safety always in mind.

12. Keep the packaging material like containers under which the material is packed, transported, stored and used in order that container developed may with-stand all possible transit hazards in connection with these operations.

13. Ensure that all containers used are cleaned both inside and outside before filling and follow through to destination to see that they are in same conditions upon receipt as and when they are supplied.

14. Make certain that the container is never the cause of consumer's discontinuing purchase of your Company's product.

Good packaging provides protection and preserves quality and further more while increasing the store life can extend the market of any pesticides. Bad packing on the other hand provides inadequate protection with the resultant loss of goods.

Pesticides Containers Storage Standards Rules for Storing and Display of Pesticides Containerss

1. Construct and maintain areas so that the risk of contamination to other products is avoided.
2. Clearly mark the area with warning signs.
3. Store Pesticides in original labelled containers, positioned so that the label is clearly visible.
4. Design the area so that the chemical and physical properties of the product, shelf life are likely to be maintained.
5. Separate volatile Pesticides from other Pesticides to avoid cross contamination and always store in unrestricted atmospheres.
6. Rotate stock to avoid expiration of shelf life if the product is to be stored over seasons; try to maintain stock to a reasonable operating minimum.
7. Display separately from other products in the stores through use of Partitions or separate enclosures.

Some Safety Aspects in Storage and Transportation of Insecticides

Insecticides are Biologically active organic chemical referred to as "active - ingredients" which may be mixed with a variety of other materials inert fillers, organic solvents, stablizers, wetting agents etc. Although they are toxic and dangerous substances, they can be handled, stored and transported safely, if proper precautions are taken. The insecticides Act and Rules, The Factories Acts and Rules, The Rules promulgated by the State Transport Authorities, The Environmental Protection Act etc. contains many stipulation which require the import, manufacture, transportation, storage and sale of Insecticides. The broad features are as follows:

(i) Every Insecticide offered for sales should have been investigated to know its physical, chemical and toxic properties and potential hazards during usage.

(ii) The material should be packed as per code of practice so that they do not leak or spill during transportation. The Packs should be labelled to give comprehensive instructions for safe use, warn on possible hazards and give guidelines for first aid in case of Accidental inhalation, ingestion or contact.

Lecture and Discussion

on

LABORATORY EQUIPMENT REQUIRED FOR EVALUATING PESTICIDES PACKAGING

Testing Methods of Packaging Containers

A sound realistic system of product and packing quality control is the best means of maintaining high sales. Quality control is an effective system for coordinating the quality maintenance and quality improvement efforts of various groups in an organization so as to enable production at the most economical levels which allow full customers satisfaction.

Testing of CFB Boxes (Corrugated Box)

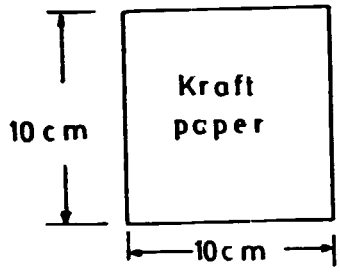
Mostly we use 7 ply kraft paper corrugated Boxes made from 100 GSM kraft paper. The boxes shall be manufactured to the style and design as agreed to between the purchaser and the supplier.

The main test for quality control of corrugated boxes are as under:

1) Grammaze
2) Bursting Strength
3) Quality and Appearance.

Grammaze:

The 7 ply corrugated boxes should be made from 100 GSM kraft paper, i.e. - 100 grms weight of one square meter kraft paper. All the seven ply used should be of 100 GSM. The grammaze is checked as follows. Take 10 cms. square sheet of Kraft paper. Take the weight of the sheet.



Area of kraft paper = 10 x 10=100 cms^2

weight of the sheet = 10 gms.

$$\text{Grammaze} : \frac{\text{weight}}{\text{area}} = \frac{10 \text{ gms}}{100\text{cm}^2} = \frac{10 \text{ gms}}{100} = 0.10 \text{ gms/cm}^2$$

In this way the grammaze of one square metre kraft paper sheet will be 100 GSM

If the weight is lower than 10 gms of 100 cm^2 sheet ; i.e. the grammaze is lower.

Bursting Strength:

The hydrostatic pressure applied at right angles to the surface at which rupture of a circular area of the paper occurs under prescribed conditions of test.

The test paper sheet is fixed on a diaphragm of 0.35 m to 0.45 mm thickness. Run the machine so that the pressure increases at a uniform rate of approx. 0.75 kgs./cm^2 per second until the test piece bursts. Note from the pressure gauze the pressure in kilograms per square centimetre at which the test piece burst. Take the average Note --- A rate of 120 revolutions per minute in the glycerine operated machine is usually satisfactory.

$$\text{Burst Factor} = \frac{\text{Bursting strength in gms/cm}^2}{\text{Substance in gms/m}^2}$$

Quality and Appearance

The kraft paper of 100 GSM should be well glazed and presentable in the market. One should have the knowledge to differentiate between kraft paper, semi-kraft paper and semi-media and media paper.

Only 100 GSM kraft paper is best for fibre board corrugated boxes. The parting of kraft liner & kraft fluted sheet should be smooth and uniform with glue.

Note: 100 GSM kraft paper fibre box of 7 ply material. The Bursting strength of pure kraft material will be 12 to 14 Kgs/cm^2.

1) 100 GSM kraft paper cost appox Rs. 9/kgs. Bursting strength 2 to 2.5 kg/cm^2.

2) Semi - media kraft paper cost Rs. 7.50/kgs. BST=1.5 to 2.0 kgs./cm^2

3) Media Kraft paper cost Rs. 5.50/kgs. BST=1.0 to 1.5 kgs./cm^2.

Testing of Metal Containers

The relevent standards referred to for Drums, Cans, Rectangular Tin or Aluminimum Bottles gives the material, Construction, Manufacture, Closure system and testing requirements of these containers. The following test methods are taken up for Metal containers.

i) Air Pressure Test - For leakage etc.

ii) Hydraulic Pressure Test - For Strength etc.

iii) Handle Pull Test and Drop Test wherever applicable. The metal sheet gauze can be checked, that should be as per customers required specification. The metal container design should be checked as per customer specification i.e. diameter, height, Neck design Pointing etc. The weight of each container should be checked as per IS - Specification or customer requirements. There should be appox. 10.0% to 15.0% extra space (ullage) in each container to rated capacity.

Each Metal container should be properly lacquered from inside. The lacquering should be resistant to the product. The aluminuim container should be Anodised.

Testing of HDPE Containers

For compatibility IS - 7551 - 1975 gives enough guidelines with respect to the suitability of the Plastics as far as the effects of formulations on the physical properties of the containers material are concerned.

The HDPE containers should be of 1.75 to 2.25 mm thickness. The weight of each container should be as per customer requirement. The design should be as per customer requirement. The HDPE containers shall be heat sealed with HDPE Plugs, finally closed with HDPE screw cap. There should be 10.0% Extra space (ullage) in each container. For study of long storage effect, the effect of contents, a comparative study of Material stored in glass bottle has to be carried out and the results regarding the potency of the Pesticides due to storage in different containers is to be compared after every 15/30 days. For HDPE Test, compression Test, stack load test and drop test etc. can also be seen.

To assess the performance test, the Transport package should be checked as under:

i) Stack load Test

ii) Vibration Test

iii) Horizontal Impact drop Tests

iv) Vertical Impact drop Tests

v) Rolling Test

vi) Compression Test etc.

Lecture and discussion

on

PESTICIDES PACKAGING AS PART OF THE REGISTRATION REQUIREMENTS INCLUDING ROLE OF LABELS

PACKAGING AND LABELLING

The packing and labelling requirements of the pesticides is a statutory stature of Insecticides Act, 1968 (India). Chapter V of the Insecticides Rules deals in the scientific requirements of packaging and labelling. The hazard during transportation, storage, use or disposal are assessed during the registration procedure and labelling is the main method of identifying the products and indicating instructions and advices to all concerned with the handling. No person shall stock or sale or distribute any pesticides and their formulation unless it is packed and labelled in accordance with the provision of the rules. The procedure for developing and appropriate and satisfactory label is therefore, closely integrated with the development and consideration of scientific data for registration. Where the level of literacy is low and where multiple language exist in the country additional problems arise and special consideration is needed.

For the purpose of registration under the Insecticides Act or any other similar Act in other countries; requirements of packaging and labelling are spelled out as under:

(A) Packaging

i. Type of packaging - Every package containing the pesticides shall be a type approved by the Registration Committee or as per ISI Specification on packaging requirements of pesticides.

ii. Manner of packaging -- If the packaging specification for pesticides do not cover (A) above, the following particulars shall be required to be furnished.

a) Packaging specification.

(i) Specifications for primary package.

(ii) Specifications for secondary package.

(iii) Specifications for transportation package.

b) The insecticides shall be packed in the containers of such sizes as specified by ISI vide specification No. IS: 8190 (part) and amendments thereof, if any.

(B) **Manner of labelling:** Labelling requirements should be as per Insecticides rules. The details of which have been discussed in the next chapter.

(C) **Leaflet requirements:** As per Insecticides Act and Rules Seven Copies of proposed existing leaflets.

(D) Instructions for storage and use including first-aid precautionary measures which are proposed for existing leaflet/labels.

(E) Information regarding disposal of used package, surplus material and washing of pesticides.

ROLE OF LABELS IN THE PESTICIDES PACKAGING

LABELS : Label means the written, printed or graphic matter on, or attached to, the pesticides, or the immediate containers thereof and the outside containers or wrapper of the retail package of the pesticides.

PACKING & MARKING

Packing: The material shall be packed in clean & dry containers. The container shall also comply with general requirement given in 2 of IS-8190 part II 1980.

Marking: The containers shall bear legibly and indelibly the following informations in addition to any other informations as is necessary under the Insecticides Act and Rules.

a. Name of material (Product name or Trade mark under which the insecticide is sold)

b. Name of manufacturer

c. Date of manufacture

d. Expiry date

e. Batch Number

f. Registration number

g. ISI Certification mark

h. Active ingredient, percent (m/m) of each

i. Nett mass of the contents

j. The minimum cautionery notice as worded in Insecticides Act and Rules.

k. Antidote statement.

The Pack must be labelled in such a way that it can be identified. This includes the above informations. It must bear any necessary safety and risk information, together with danger mark and toxicity level.

Extremely Toxic	- Bright Red colour - Category I	Symbol of skull and cross by word 'Poision'
Highly Toxic	- Bright yellow colour -Category II	POISON
Moderate Toxic	- Bright Blue colour -Category III	POISON
Slightly Toxic	- Bright Green colour - Category IV	CAUTION

Lecture and discussion

on

DISPOSAL OF EMPTY PACKAGE

Disposal of Empty Packages

Production and use of pesticides around the world leads to the generation of waste pesticides and used Pesticides Containers at a number of stages between the manufacturer and farmer. Quantitatively,. the process of manufacture and formulation are the most important points of pesticides waste generation, but the potential hazards associated with waste pesticides and containers on the farm are sufficient to require special attention.

Each aspect of pesticides handling has its own type and degree of potential hazard. In the case of managing waste Pesticides and Containers, poor practices may lead to effects varying from acute through to chronic toxic exposure, in adults and children, pets and working animals. The Empty containers and unwanted pesticides can be serious hazards if they are not disposed of properly. There is a hazard to general public and risk of contamination of environment etc. Therefore the safe disposal is essential and is an important part of the overall responsibility of every person involved in handling and application of pesticides.

Selection of Disposal Site:

The disposal site for used container should be far from the working place/residing place and 30 to 60 metre away from water or well. There should be a large pit of 2-3 metre depth for safe disposal of waste pesticides containers. The disposal site should be soundly fenced to keep out children, livestock and wildlife. A gate sign referring to the presence of pesticides or poison is recommended.

Disposal:

a) **Combustible Containers** should be burnt except where, in the case of some herbicides, labels warns against burning of Phenoxy acid herbicides, requires extra care to prevent crop damage. Burning should be carried out where wind will not cause contaminated smoke to drift over nearby human, people, livestock, crops or the person doing this jobs. The local authorities should therefore be consulted before burning pesticides containers.

Caution

Drums or bottles may be under the piles to be burnt. Ensure that bungs and caps are removed, or that containers are punctured to prevent explosion.

b) **Non-Combustible Containers:**

For 50 litre to 200 litre Drums

i) After proper rinsing return them to the supplier.

ii) Sell them to a firm dealing in used drums or barrels that is equipped to neutralize the toxicity of adhering materials.

iii) Take them to a sanitary landfill type of dump. Inform the Operator of the dump that the drums contains residues of poisonous materials, warn him that poisonous vapours may be produced if the containers are burnt.

iv) If none of the proceding disposal means are available to you, find a private disposal site of the type described above which you will use only for empty containers.

v) Do not reuse for any purpose.

Small Containers upto 20 litres Capacity:

After properly rinsing, small containers may be disposed of at a Public dump or buried atleast half a metre deep at a private disposal site. First remove the caps or lids, punch holes in metal containers, break glass containers. Do not use containers for storage of food feed or water for domestic consumption.

c) **Herbicides Containers:**

1) After triple rinsing before disposal, burn containers except where labels advice against it. When some herbicides or defoliarots volatilize the resulting vapours may be poisonous to humans or they may damage nearby crops of farmers. Herbicides or defoliants containing chlorates may explode when heated.

2) Break glass herbicides containers. Chop holes in top, bottom and sides of the metal containers, so that they cannot collect water or be re-used or crush them under a tractor wheel or with an axe or sledge hammer. Also crush fibre/drums, card-board and paper containers, after breaking, crushing or puncturing them, bury the containers at a depth of half a metre or more at a safe disposal site, or take them to a dump that does not burn its refuse.