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PESTICIDE DEVELOPMENT PROGRAMME IN INDIA

DP/IND/80/037

INDIA

Technical report: Findings and recommendations*

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

Based on the work of Mr. R. Teuber-Weckersdorf
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Vienna

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CONTENTS

1. Acknowledgment

I want to thank Dr. S. Kethan and the other employees of PDPI for their hospitality and their assistance to do my work in this country.

I would like to express my thanks to Mr. S. P. Dhua, General Manager of HIL for giving me the opportunity to see the Plant Rasayani.

Thank you to Mr. M. Islam, UNDP, and Mr. Sat Pal, UNDP, for their submission for my work in India.

Summery

UNIDO and the Indian government offered me the chance to visit the R & D Centre of PDPI in Gurgaon.
The equipment of this R & D Center is best to meet the demands of modern formulation technology. There is also the necessary equipment for the scale up from laboratory use to Pilot Plant use. The colleagues of Dr. Khetan are best trained chemists and formulation technicians, who are also masters of all modern technologies like SC, WDG, etc. and who are capable to teach their abilities and knowledge.

2. Conclusions and Recommendations

2.1. Technical equipment - Laboratory

In my opinion the equipment of the laboratories is very good and meets all necessary demands. Difficulties could arise from the high temperatures, especially the laboratory Dyno-Mill must be joined to a cooling system but it does not exist till now.
Not very sufficient are the scales there.
They have no density meter in order to determine the density on the spot at once.

Recommendations

1. A small cooling system for the Dyno-Mill and the density meter (Anton Paar K.G., A-8054 Graz, Austria).

2. Electronical Scale in the range of 10 g - 5.000 g

2.2. Safty Equipment - Laboratory

The rooms are genereous dimensioned and meet the demands. It is advisable to establish a non stationary exhaustion equipment ot avoid any dust development when formulating batches.

Recommendations

1. Moveable exhaustion equipment
2. Eye-wash bottles in every room,
3. Extinguish shower in every room
4. Non-inflammable buckets

2.3. Technical equipment - Pilot Plant

Also here all the necessary equipment is available. For the production of Flowables a cooling aggregat for the Dyno-Mill has to be ordered in any case. Further I would recommend an Ultra-Turrax stirrer to reach a good dispergation and pre-grinding before using the Dyno-Mill. It should replace the on-line milling with the collodial mill. The batch-container should get an outlet at the bottom. For the formulation of EC I would suggest a Nirosta container (200 l content) with stepless adjustable mixer.

Recommendations

1. Cooling system for Dyno-mill
2. Ultra Turrax dissolver, IKA-Maschinenbau Janke & Kunkel GmbH & Co.KG. Postfach 1165, Janke-un-Kunkel-Str. D-7813 Staufen, Federal Rep. of Germany.
3. Bottom outlet for batch-container
4. 200 l batch-container made of Nirosta and stepless adjustable propeller agitator

2.4. Safty Equipment - Pilot Plant

There exists a very good exhaustion system. As improvement I would like to advice that the compressor is placed outside the building because of the noice annoyance. If there should be planed a new building I would recommend a closed sewage disposal and elimination plant.

Recommendations

1. Compressor outside the building
2. Improvement of the spillage water
3. Moveable eye-wash stations

2.5. Packaging and storage tests

This time there are neither any packaging tests of bottles, containers, wrapping materials, etc. nor any storage tests be realized.
From Dr. Khetan and Mr. Kumar I heard that PDPI knows about this neglect. With the purchase of a Brabender they get the possibility to test the shelf life of product and packaging.

Recommendations

1. Equipment of a packaging-laboratory
   There is a suitable space in the first floor of the Pilot Plant
2. Purchase of a Brabender

3. Development of Formulations

The main fields of PDPI consist of 2 components:

3.1. Development of new formulation-technologies and preparation of new compositions

3.2. Training and service for Indian formulation plants

3.1.1. Development of new formulation technologies and preparation of new compounds:

In this field the employees of PDPI have done a very good work. They made trials from all kinds of formulations which are in use to-day like Flowables, WDGs, Coated Granules, etc. The samples shown to me were correct in the chemical way. Though, only one formulation was produced each.

Recommendations

PDPI should develope new formulations resp. compositions independently and the results they should offer to firms interested in them.

A "file" for that could look like the following:

1. Product
2. Physical and chemical data sheet of AI
3. Composition
4. Physical and chemical data of all ingredients
5. Manufacturing Manual
6. Analytical methods
7. Physical chemical methods
8. Packaging, shelf-life and labelling
9. Safty aspects

To create this file all departments of PDPI have to be coordinated. A guide for the steps of formulation development could be like the following:

1. Formulation chemist has to work out the composition
2. To-gether with the chemical engineering staff the first smallscaled batch has to be prepared in the laboratory
3. After testing the product, and when result is OK
4. first Pilot-Plant batch (up to 50 - 100 kg) has to be produced together with the formulation chemist (Assistant)
5. Testing the result and if necessary up to 5 batches have be formulated. In my opinion this should be the maximum for trials.
6. Testing and determination of final packaging and labelling
7. Note the data in a file (completely) for that product
8. During all small-scaled batches the persons from the production should be involved already
9. First big scale batch should be produced together with the chemical engineer of R & D department
10. Running the plant without assistance of R & D Dept. but if help is necessary there always must be anybody for information

3.2.1. The training programmes should be more forced. Further there should be more publicity for these programmes in order to catch as many members as possible.

Beside the professional further education of the participants the self preservation of PDPI should be guaranteed.
I think it would be best to contact companies whose employees have already attended training programmes in Gurgaon.
These are the following firms beside others:

Excel Industries Ltd.
Swami Vivekand Road,
Jogeshwari
Bombay- 400 102

United Phosphorus Ltd
167, Dr. Annie Besant Road,
Worli, Bombay 400 018

Dhrangandra Chemicals & Pesticides
31, Jamnadas Industriel Estate
opp. Jawahar Talkies Dr. R. P. Road
Mulund (W) Bombay 400 080

All India Medical Corporation
Akhand Jyoti, 8th Road,
Santacruz (E) Bombay 400 055

India Pesticides Private Ltd
Water Works Road,Aishbagh,
Lucknow 226 004

They all were very much impressed by the efficiancy of the R & D Center. They only have one big reservation - it concerns the closed relationship between PDPI and HIL. In their opinions there exists the big danger of an encroachment of competition.

3.2.2. Management of PDPI

In my opinion there should be ordered a forecast to determine which active ingredients and which formulation technologies will be important in the next years in India. After working out complete product files (composition, formulation instructions) for the most important products these files should be presented to the authorities for registration. After having the registration numbers they should be used commercially.

Another developement could be an "export" of formulation Know-How to the neighbouring countries.

3.2.3. An additional chance to become independent in finances could be a small scale production of various formulations in the Pilot Plant. Especially Flowables are surely most efficiant with 500 - 800 kg a day. An appropriate filling equipment must be provided.

4. HIL

Hindustan Insecticide Ltd is producer of technical active ingredients like DDT, BHC, Endosulfan, Dicofol, Malathion, Monocrotophos and Butachlor. Besides these active ingredients they product different formulations in 4 plants:

Delhi-Plant:	Capacity about 10.000 t
Rasayani Plant: in Bombay	Capacity about 23.000 t
Udyogamandal Plant: in Cochin	Capacity about 15.400 t
Rajamundri Plant: in Andra Pradesh	Capacity about 17.000 t

4.1. Multi Purpose Formulation Plant

Beside my work with PDPI on behave of the UNDP I was working together with Dr. Dhua and Mr. Luthra of HIL for a lay-out for a multi purpose plant for formulation of pesticides which should be established next to the R & D Center Gurgaon. We worked out a formulation plant for EC, SC, WP and Granules although we have to think of separated production for herbicides and insecticides. All security equipment has been planed too and the facilities which are necessary to run a plant. The warehouse was planed too with a capacity of about 5000 pallets.

4.2. Rasayani plant

On 20th of June I had the opportunity to visit the Rasayani plant near Bombay. Beside the plant for active ingredients there is a new formulation plant in construction. The new building will be used for the formulation of the emulsifying concentrates Butachlor and Monocrotophos. The rooms are separated because of herbicides and insecticides.
As recommendation I would suggest to make a covered spillage system and a storage tank of ready formulated and analysed products, because of the electronical filling station has a capacity of 200 - 400 bottles of 5 l/kg. The storage tank capacity should have at least 5000 l. In the future I would like to suggest to use flowmeters instead of storage tanks for batch quantities.

APPENDIX 1

Major Contacts

UNDP

Mr. Sat Pal, Assistant to SIDFA

Dr. M. Islam, UNIDO, Senior Industriel Development Field Adviser

Hindustan Insecticides Ltd

Dr. S. P. Dhua, Chairman & Managing Director*

Mr. Munni Lal, General Manager Projects

PDPI

Dr. Sushil K. Khetan, Head

Mr. S. Kumar, Senior counterpart

Dr. P. K. Ramdas, Group Leader, Formulation Section

Dr. R. Khandal, Clay mineralogist

* Dr. Dhua is also Chairman of the PDPI Governing Body