OCCASION

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

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

22034

Final Report

UNIDO Project DG/CPR/91/121
Training Programme on Assistance to Formulation Development

UNIDO CONTRACT No. 96/168

27. 8. 1998

F. Joh. Kwizda
Gesellschaft mbH.
A-2100 Leobendorf

Roger Teuber-Weckersdorf
General Plant Manager

UNIDO PROJECT DG/CPR/91/121
Training Programme on Pesticide Formulation Developement

UNIDO CONTRACT No. 96/168

March 1997:

Mr. Zhang Qiming
Mr. Hua Niazhen

April/May 1998:

Mr. Gu Jinli
Mr. Hang Shirong

Duration: Each party for 3 weeks

ABSTRACT

Kwizda plant is a multi purpose plant for pesticide formulation. Due to its diversification of products we are able to formulate all kinds of formulation technologies in a scale which is interesting for a country like China (small units). Skillful technicians, formulation specialists and analytical experts could give our guests an intensive overview. Openminded we tried to give our know how, especially on safety and maintenance but also in advanced technics to our guests from China. One major point was the seed dressing programme together with a visit of a private seed dressing station.

TABLE OF CONTENT

Formulation developement:

* WG, SG (Pilot Plant)
* SC, SC-Seeddressing
* Coated granules

Training in "Big Scale" formulation:

* MC-Formulation
* WG-Formulation
* EC-Formulation
* SC-Seeddressing and normal SC Formulation
* G - Coated Granules

Laboratory:

* Analytical control
* Physical control
* Packaging and storage test
* Seed-dressing testing

./3

Formulation Developement:

DG, SG:

Due to our experiance in this type of formulation we could show the importance of the balance inerts to Active Ingredients on three different products.
In our Pilot Plant we prepared the suspension on a Dyno-Mill (Beet Mill 0,5 l) and sprayed later with an Aeromatic MP 1 Fluidbed Granulator. Particle Size of the active ingredients and viscosity of the suspension are important criterions.

SC-Seeddressing:

Small scale formulation with Dyno-Mill (Beet Mill). Special type of formulation to get a good coating of the cereals. Determination of the abrasion of the treated cereal. The cereal was treated in a pilot scale equipment (HEGE) and afterwards analytical control of the Active Ingredient in the cereal. (Quick test - colourmetric test.)

Coated Granules:

Slow release of insecticide AI on a marple granule. Small scale trials in a concrete mixer (very easy to handle).

Training in Big Scale Formulation:

MC-Formulation: Microcapsule Suspension

This very unique type of formulation is part of a world patent belonging to an employee of Kwizda, Mr. Zsifkovits. He and his team could show the inside process from beginning till the final packaging. We explained the main difficulties and tried to submit the physical chemical flow-sheet.

WG and SG: Water dispersible or water soluble granules

Starting from a suspension concentrate produced in a 54 l Beet Mill with a capacity of 600 l/h and afterwards spraying in Aeromatic fluid bed sprayer granulator MP-6 with a capacity of 80 kg/h. Together with our operators they could watch every step very carefully till the evaluation of important parameters.

EC-Formulation: Emulsifying concentrates

According to our very modern facility we could show them how to produce this type of formulation without big hazards (suitable solvents with a flash point of more than 65 °C) and in a very proper way. Specially due to the situation that this formulation type is very common in developing countries.

SC-Seeddressing Formulation:

Suspension concentrates formulation in a modern type of safer use technology. This technology is well known in our company. For 20 years we have experience in that type of formulation. Important for SC used in a seeddressing product is the sticker and the colour. The sticker is important that an abrasion cannot happen after packing. The colour is important because of two reasons:

Showing that the dressing is optimal

Showing that the cereal is treated and must not be used for consumption

Specially the question of the sticker has been solved in our company (natural sticker).

Coated Granules:

This formulation is important for slow release of the active ingredient. Specially used in broad casting by special equipment. The coating can be done by PVA (Polyvinylalcool) and some other products. Two batches with different active ingredients have been formulated..

Laboratory

Analytical control:

Our specialists could show them the testing methods of our laboratory

* HPLC - High pressure liquid cromatography
* FTIR
* Titration
* Colormetrical measurments

Physical-chemical determination

* Density
* Suspensibility
* Viscosity
* pH
* particle size (Laser diffraction)
* Sieve test
* Spray test

All these tests where done in our laboratory together with our people. They could work themselves under supervision.

Seed dressing station

One day was seperated for a visit in an extern seed dressing station - Probstdorfer Saatzucht. This seed dressing station is a very big station with a lot of international cooperations. They could see different types which were treated with products formulated at Kwizda:
Cereals with Panoctin plus, with Rovral TS and with Gervit Universal.

CONCLUSION

We think, that we could show and demonstrate our guests from China that one can manage safe pesticide formulation without an enormous amount of money. Careful working and absolute cleaness are the most important things and these two subjects does not cost anything. The knowledge we could give them was deeper than in any other company as they told us. The only information we could not give to them were exact compositions of formulations. All other questions we tried to answer in a very open way.

APPENDIX

* Formulation Types and Codes (International)

* Milestones and History of Kwizda

* List of Kwizda employees working with the guests

Appendix 2

Preparation (Formulation) Types and Codes*

Code	Description	Definition
AB	Grain bait	Special forms of bait.
AE	Aerosol dispenser	A container-held preparation which is dispersed generally by a propellant as fine droplets/particles upon actuation of a valve.
AL	Other liquids to be applied undiluted	Self defining.
BB	Block baits	Special forms of bait.
BR	Briquette	Solid block designed for controlled release of active ingredient into water.
CB	Bait concentrate	A solid or liquid intended for dilution before use as a bait.
CG	Encapsulated granule	A granule with a protective or release controlling coating.
CS	Capsule suspension	A stable suspension of capsules in a fluid normally intended for dilution with water before use.
DC	Dispersible concentrate	A liquid homogeneous preparation to be applied as a solid dispersion after dilution in water.
DP	Dustable powder	A free-flowing powder suitable for dusting.
DS	Powder for dry seed treatment	A powder for application in the dry state directly to seed.
EC	Emulsifiable concentrate	A liquid, homogenous preparation to be applied as an emulsion after dilution in water.
ED	Electrochargeable liquid	Special liquid preparation for electrostatic (electrodynamic) spraying.
EO	Emulsion, water in oil	A fluid, heterogeneous preparation consisting of a dispersion of fine globules of pesticide in water in a continuous organic liquid phase.
ES	Emulsion for seed treatment	A stable emulsion for application to the seed either directly or after dilution.
EW	Emulsion, oil in water	A fluid, heterogeneous preparation consisting of a dispersion of fine globules of pesticide in an organic liquid in a continuous water phase.

Appendix 3 Preparation (Formulation) Types and Codes*

Code	Description	Definition
FD	Smoke tin	Special form of smoke generator.
FG	Fine granule	A granule in the particle size range from 300 to 2500 μ.
FK	Smoke candle	A smoke generator in the form of a candle.
FP	Smoke cartridge	Special form of smoke generator.
FR	Smoke rodlet	Special form of smoke generator.
FS	Flowable concentrate for seed treatment	A stable suspension for application to the seed either directly or after dilution.
FT	Smoke tablet	Special form of smoke generator.
FU	Smoke generator	A combustible preparation generally solid, which upon ignition releases the active substances in the form of a smoke.
FW	Smoke pellet	Special form of smoke generator.
GA	Gas	A gas packed in pressure bottle or pressure tank.
GB	Granular bait	Special forms of bait.
GE	Gas generating product	A preparation which generates a gas by chemical reaction.
GG	Macrogranule	A granule in the particle size range from 2000 to 6000 μ.
GP	Flo-dust	Very fine dustable powder for pneumatic application in glass-houses.
GR	Granule	A free-flowing solid preparation of a defined granule size range ready for use.
GS	Grease	Very viscous preparation based on oil or fat.
HN	Hot fogging concentrate	A preparation suitable for application by fogging equipment either directly or after dilution.
KN	Cold fogging concentrate	A preparation suitable for application by cold fogging equipment, either directly or after dilution.
LA	Lacquer	A solvent based film-forming preparation.
LS	Solution for seed treatment	A solution for application to the seed either directly or after dilution.
MG	Microgranule	A granule in the particle size range from 100 to 600 μ.

Appendix 2 Preparation (Formulation) Types and Codes*

Code	Description	Definition
OF	Oil miscible flowable (=oil active substances in a miscible suspension)	A stable suspension of concentrate fluid intended for dilution in an organic liquid before use.
OL	Oil miscible liquid	A liquid, homogenous preparation to be applied as a homogenous liquid after dilution in an organic liquid.
OP	Oil dispersible powder	A powder preparation to be applied as a suspension after dispersion in an organic liquid.
PA	Paste	A water based film forming preparation.
PB	Plate bait	Special forms of bait.
PC	Gel or paste concentrate	A solid preparation to be applied as a gel or a paste after dilution with water.
PR	Plant rodlet	A small rodlet, usually a few centimetres in length and a few millimetres in diameter containing active substance.
PS	Seed coated with a pesticide	Self defining.
RB	Bait (ready for use)	A preparation designed to attract and be eaten by the target species.
SB	Scrap bait	Special forms of bait.
SC	Suspension concentrate (= flowable concentrate)	A stable suspension of active substance(s) in a fluid intended for dilution with water before use.
SE	Suspo-emulsion	A fluid, heterogeneous preparation consisting of a stable dispersion of active substance(s) in the form of solid particles and of fine globules in a continuous water phase.
SG	Water soluble granules	A preparation consisting of granules to be applied as a true solution of active substance after dissolution in water but may contain insoluble inert ingredients.
SL	Soluble concentrate	A liquid homogenous preparation to be applied as a true solution of the active substance after dilution with water.
SO	Spreading oil	A preparation designed to form a surface layer on application to water.
SP	Water soluble powder	A powder preparation to be applied as a true solution of the active substance after solution in water but which may contain insoluble inert ingredients.

Appendix 2 Preparation (Formulation) Types and Codes*

Code	Description	Definition
SS	Water soluble powder for seed treatment	A powder to be dissolved in water before application to the seed.
SU	Ultra low volume (ULV) suspension	A suspension ready for use through ULV equipment.
TB	Tablet	Solid preparation in the form of small, flat plates for dissolution in water.
TP	Tracking powder	A rodenticidal contact preparation in powder form.
UL	Ultra low volume (ULV) liquid	A homogenous liquid ready for use through ULV equipment.
VP	Vapour releasing product	A preparation containing one or more volatile ingredients, the vapours of which are released into the air. Evaporation rate normally is controlled by using suitable preparations and/or dispensers.
WG	Water dispersible	A preparation granule consisting of granules to be applied after disintegration and dispersion in water.
WP	Wettable powder	A powder preparation to be applied as a suspension after dispersion in water.
WS	Water dispersible powder for slurry seed treatment	A powder to be dispersed at high concentration in water before application as a slurry to the seed.
XX	Others	

*based upon the catalogue of Pesticide Formulation types and International Coding Systems, developed by GIFAP in co-operation with the German working group on documentation questions. (Arbeitsgruppe EDV Pflanzenschutz Versuchswesen). GIFAP Technical Monograph No 2, 1989.

Milestones

1853	Franz Johann Kwizda establishes the Korneuburg District Pharmacy and starts producing veterinary pharmaceuticals
1888	Julius Kwizda succeeds his father and continues pharmaceutical production
1900	Awarded the Grand Prix at the World Exhibition in Paris
1924	Richard Kwizda takes over the company founded by his grandfather
1926	Plant and crop protection division established
1934	Pharmaceutical wholesale business established
1942	Purchase of the Sonnhof estate
1953	Auxin herbicides containing MCPA used on cereals for the first time
1955	Expansion of the cosmetics and drugstore division
1959	Triazines (Gesaprim) launched onto the market as a herbicide for maize
1968	Hormosan - Kwizda GmbH founded in Frankfurt/Main, Germany
1968	First mercury-free carboxin-based seed dressing agent
1970	Post-emerging herbicides (Betanal) used on beet for the first time
1978	Richard P. Kwizda and Johann F. Kwizda appointed joint managing directors
1979	Systemic fungicides introduced onto the market
1982	Production unit and logistics centre inaugurated in Leobendorf
1983	New pharmaceutical factory goes on stream in Vienna
1986	Sulphonyl ureas used in minimal application concentrations for the first time as herbicides for cereals
1987	New pharmaceutical wholesale centre opened in Vienna
1990	Kwizda Hungaria founded in Budapest

1994 Acquisition of Gartenhilfe GmbH, Linz, Austria
Foundation of Magyar-Kwizda Kft., Budapest
Foundation of Büsscher & Hoffmann SRO, Brno, Czech Republic

1994 Acquisition of the worldwide marketing rights for the biogenic rodenticide SILMURIN manufactured by Sandoz

1995 Foundation of F.J. Kwizda Kosmetik München GmbH
Foundation of VIKEM-KWIZDA, France

1997 **Awarded the FFF[1] golden plaque for research by Dr. Farnleitner, Federal Minister of Economics**
ISO 9002 certification and introduction of a new quality management system at the Leobendorf plant

1998 Start-up of the WG II formulation plant in Leobendorf/Korneuburg
Foundation of Kwizda Agro Vertriebs GmbH in Hofheim a.Ts., Germany
Foundation of Kwizda Italia SRL in Bologna, Italy

[1] Research Assistance Fund

The activities of Kwizda's Agricultural Division in connection with the formulation and production of plant and crop protection products span several decades and have gained the company a high international reputation. The inauguration of the **WG II plant, an exemplary installation for the production of water-soluble and water-dispersible herbicide granules**, marks yet another milestone in the field of research and development.

The WG II plant was built in a period of 8 months at Kwizda's Leobendorf location near Korneuburg and was officially inaugurated on 28 May 1998.

At the heart of the installation are two dry spray granulators, 12 metres in height and 2 metres in diameter. It is here that the liquid premix, which is fed into the system from another unit, is converted into granules. The finished product passes via an intermediate storage hopper to the filler where it completes an automatic check weighing cycle before leaving the line ready packaged.

The WG II installation is equipped with an electronic menu-driven control system. All process parameters are continuously registered and logged during operation. The entire engineering and formulation know-how was provided by Kwizda chemists and technicians. The installation was constructed in collaboration with Ammag and Pender to comply with the highest quality and safety standards. This achievement has received due recognition from leading companies such as Agrevo, Cyanamid, Dow AgroSciences, FMC, Novartis - to name but a few - who commission Kwizda to produce a wide range of crop protection products destined for the European, Australian and South American markets.

Last but not least, this plant for the production of user-friendly and ecologically sound formulations epitomizes Austria's high level of value-added activities. Raw materials, auxiliaries, consumables and packaging material are all purchased from Austrian manufacturers. The creation of up to ten new jobs also marks a positive contribution to the local employment market.

Kwizda - an Austrian success story

The origins of our group of companies are to be found in the district town of Korneuburg on the Danube, northwest of Vienna. It was here that the pharmacist and horse lover Franz Johann von Kwizda founded his chemist's shop "Zum schwarzen Adler" in 1853 and became one of Austria's first producers of veterinary and pharmaceutical preparations.

Imperial privilege and Grand Prix

Kwizda's products soon won acclaim. His restorative ointment for horses was granted exclusive rights in the form of an imperial and royal privilege and was soon in demand far beyond the borders of the Danube monarchy.

When veterinary surgeon and pharmacist Julius Kwizda went on to develop the business, the quality of his products won recognition at the World Exhibition in Paris in 1900 with the award of the much coveted Grand Prix. Thus, top quality has always been a cornerstone of our company's philosophy right from the very early days.

"Scientia industriae fundamentum" - the motto behind our success

In 1923 Richard Kwizda, senator, pharmacist and general consul for Denmark by royal appointment, took over as head of the company. It was under his management that the Agricultural Division was founded. His enthusiasm for science and research and his policy of working closely with fellow scientists and researchers in this field were to open up whole new dimensions for the company.

His guiding principle that a sound business can only be developed on the basis of scientifically founded know-how has always been the cornerstone of our corporate strategy.

Now in its fourth generation, the Kwizda Group is run by the managing partners Richard P. Kwizda and Dr. Johann F. Kwizda as a modern, market-oriented organization and family business which employs 800 people.

Kwizda has business areas which dedicate their activities to pharmaceuticals, pharmaceutical wholesale, agriculture, home and garden products as well as roofing and waterproofing. In each of these sectors, Kwizda is either market leader or close to achieving this position.

The Group's rising fortunes are perhaps most clearly expressed in figures: over the past 25 years turnover has virtually increased tenfold, passing the 4 billion Schilling mark in 1997. This development in sales volume has gone hand in hand with a complete realignment of the production facilities and sales structures.

With equity capital amounting to 50 per cent of the balance sheet total, Kwizda is well equipped to meet the challenges of future development.

The foundation of Hormosan-Kwizda in the Federal Republic of Germany established an early foothold in the European Community. In the future we shall focus increased attention on the new European dimension in our drive for pharmaceutical exports. The central European markets for the business areas of agricultural products, "Gartenhilfe" and Büsscher & Hoffmann are proving to be particularly dynamic.

In addition to market investments, we are also channelling considerable effort into the maintenance of our particularly high technical standards. The budget assigned to this purpose is currently running at 100 million Schillings, with similar amounts envisaged for future years.

FFF awards the Kiwzda Group its golden plaque for research achievements

On 19 September 1997, the managing partners of the Kwizda Group, Dr. Johann Kwizda and Richard Kwizda, officially received the golden plaque for research achievements from the Austrian grants scheme for trade and industry.

The award was presented by the Federal Minister for Economics Dr. Johann Farnleitner at Kwizda House, Dr. Karl Lueger-Ring 6 in Vienna.

The Kwizda Group was given this award in honour of its successful research activities in the area of life science, particularly in respect of the development of modern forms of medicine as well as new formulation technologies and active ingredients for agricultural applications.

In addition, visionary research projects have also been initiated by the subsidiaries Büsscher & Hoffmann (roofing and waterproofing) and "Gartenhilfe" (products lines for home and garden).

The following research highlights from the recent past are particularly noteworthy:

KWIZDA-Pharma

Development of a modern therapeutic drug for the treatment of ulcers: Kwizda developed its own galenical based a new approach to synthesizing active ingredients. This drug is marketed under the name of "Ulcusan" and now ranks amongst the leading products in this field with a 23% share of the Austrian market.

A non-steroid analgesic/antirheumatic has been formulated in collaboration with the Japanese company TAIHO and is currently still in the development phase. This product, which goes under the international name of "Mofezolac", has considerably reduced side effects on the stomach. In this project, which is supported by the Viennese Industrial Grants Scheme, a new active ingredient synthesis was developed in collaboration with the Technical University of Vienna. Long-term toxicological testing costing 14 million Schillings was successfully completed by the Austrian Research Centre in Seibersdorf on our behalf.

KWIZDA-Agro

The main emphasis of research activities is on environmentally friendly developments based on an awareness of the need to achieve harmony between ecological and economic concerns. The formulation of ingredients for crop protection in the form of water-dispersible granules (referred to as "WDGs") was one of these projects which was assisted by the FFF and the ITF[2]. The result will be an environmentally sound application without the need for organic solvents, which

[2] Investment and Technology Fund

allows simple dosage and does away with hazardous packaging waste, thus causing no harm to either the user or the environment. As well as leading to collaboration in the sense of toll formulations in cooperation with and on behalf of international partners such as the following (in alphabetical order):

AGREVO - DOW ELANCO - FMC - NIPPON SODA - NOVARTIS - SIEGFRIED - SMITOMO - ZENECA -

this know-how has also resulted in the setting up of a large-scale production facility for an annual output up to one thousand tonnes which is nearing completion.

A particularly challenging project, currently in the patent phase in collaboration with HAAS-Waffelmaschinen-Biopac, is the development of water-soluble packaging for crop protection products. Packed in amounts to suit the individual requirements of farmers and sealed into a sturdy water-soluble sachet, the product simply dissolves in the spray tank on its way to the field!

KWIZDA Group - Büsscher & Hoffmann Waterproofing Systems

You're probably already asking yourself: what has this got to do with life sciences? The answer is - a lot - once you know that the natural raw material bitumen, known to man since time immemorial and widely used today, forms the basis for the roofing and waterproofing materials manufactured by Büsscher & Hoffmann. And just to clarify a frequent misconception: apart from the colour black, bitumen and tar have absolutely nothing in common. As well as being safe to health and the environment, bitumen is long-lasting and presents no problems for disposal or recycling.

This material was also at the heart of one of the successfully completed projects on the subject of "green waterproofing made of root-resistant bitumen polymer sheets", allowing the creation of "green" roofs and compensation for lost natural spaces. Internationally famous art can also be included - as proven by the Hundertwasser house in Vienna, which was also prepared for "greenification" using Büsscher waterproofing sheets.

KWIZDA Group - Gartenhilfe

Our youngest subsidiary has been manufacturing and marketing products made of peat for gardening and landscaping under the brand name of Grünsiedl for several decades.

The know-how related to peat resources led to a search for alternative products and one area which attracted our attention during the course of research was waste materials in the paper-making industry.

Here again, we found what we were looking for and in the process of a research project on the "development of a high-quality peat substitute", the results of which are currently in the patent phase, developed a product which matches the qualities of peat and is currently burnt as waste by the paper industry.

KWIZDA and research within the European Union

Brussels' doors have not remained closed to us either. Our project on "cyclodextrin biocide complexes" was selected and supported within the framework of the third call for proposals under the programme specifically related to agriculture and fisheries. The project, which we coordinated in collaboration with Wacker Munich, TNO Holland, Serbios Italy, the Institutes for Pharmaceutical Technology, Pharmacognosy and Theoretical Chemistry of the University of Vienna and the Seibersdorf Research Centre, was one of a total of 794 proposals. 17 projects with Austrian involvement were approved; two of these have Austrian coordinators, one of whom is Kwizda.

The results of all these research activities mentioned above have constituted a solid contribution towards the economic development of our corporation over the past few years.

List of Kwizda employees, working with the guests

Willy Zsifkovits
Deputy Plant Manager
Technical Affairs, Tollformulation

Kwizda
Division Landwirtschaft, Plant Leobendorf
F. Joh. Kwizda Gesellschaft mbH
A-2100 Leobendorf, Laaer Strasse
Phone: : +43/2262/735 40-37, Telefax: +43/2262/735 40-49

Kwizda
Agro

Dipl. Ing. Roger Teuber-Weckersdorf
Director
Plant Manager

F. Joh. Kwizda GmbH, A-2100 Leobendorf, Laaer Bundesstraße
Tel: +43-2262-73540-0, Fax: +43-2262-73540-49
e-mail: r.teuber@kwizda.co.at

Ing. Thomas Stock
Leiter der Qualitätskontrolle
Qualitätsbeauftragter

Kwizda
Division Landwirtschaft, Werk Leobendorf
F. Joh. Kwizda Gesellschaft mbH
A-2100 Leobendorf, Laaer Strasse
Tel.: +43/2262/735 40-28, Telefax: +43/2262/735 40-49

Kwizda
Agro

Ing. Martin Friedrich
Technischer Projektleiter

F. Joh. Kwizda GmbH, A-2100 Leobendorf, Laaer Bundesstraße
Tel: 02262-73540-42, Fax: 02262-73540-49

Kwizda
Agro

Christine Wimmer
Assistant to plant manager
Customer Services, Purchasing

F. Joh. Kwizda GmbH, A-2100 Leobendorf, Laaer Bundesstraße
Tel: 02262-73540-29, Fax: 02262-73540-49