NEW TRENDS IN CROP PROTECTION FORMULATIONS: 2013 EDITION

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EXECUTIVE SUMMARY

‘New Trends in Crop Protection Formulations’ is a complete update of the previous 2005 Edition of this report, which was entitled ‘New Developments in Crop Protection Product Formulation’. The current status of all formulation types is discussed along with additional sections on Glyphosate formulations and Oil Dispersion formulations. The section of the report on Biopesticide formulations has been completely revised to reflect the increasing interest in biopesticides as potential safer alternatives to, or partners for, chemical pesticide formulations. Sub-sections of the report highlight the essential differences between procedures for the formulation of biopesticides and those for the conventional formulation of synthetic chemical pesticides.

The sections of the report on surfactants, adjuvants, solvents and other formulation additives have been brought up to date in the light of the changes to regulatory requirements for additives which are very safe to humans and to the environment. Low, or no, skin and eye irritation have become very important for formulation additives, as well as for the finished formulation product. Sustainability of materials made from renewable natural products wherever possible is also discussed, leading to finished product formulations with the lowest possible hazard classification on product labels.

The section of the report on Future Trends in Pesticide Formulations gives an account of how product development is moving away from the old technologies of dusty powders and petroleum-based solvent formulations, towards the new technologies of water based suspensions and emulsions, and microcapsules. Oil dispersions and water dispersible granules are also becoming more popular. It is estimated that the ratio of the number of products made by old technology compared to new technology is about 65/35 globally at the present time. However, this ratio varies considerably from region to region. There is, therefore, still further scope for improving the safety and convenience of pesticide formulations worldwide.

The use of surfactants and oil-based adjuvants for enhanced biological activity is another rapidly developing area. Research is continuing on the mode of action of active ingredients and on ways of improving spray retention, spreading, uptake and translocation through plant leaves.

Some examples of nanotechnology for enhanced biological activity are included in this Edition. A definition of regulatory requirements for formulations containing nanoparticles is still awaited.

At the present time in 2013 there are six major international R&D companies, the so-called ‘Big 6’, three based in Europe and three based in the USA. Generic pesticide producers are
now much more important to the business as a whole. In fact the top few generic pesticide companies are approaching the ‘Big 6’ companies in terms of annual sales. Another major change, which has occurred over the last few years, has been dominance of Chinese pesticide companies in the production of technical active ingredients for export. More recently, Chinese companies have begun to obtain registrations outside China for their formulated products. Chinese companies are growing rapidly, and in 2012 ChemChina acquired a 60% controlling stake in Makhteshim Agan, which was already the top generic pesticide company in the world.

During the period since the first Pesticide Formulation report was published by Agrow in 1995, the sales value of the global agrochemical business at end user level increased annually to a peak of about US$ 32 billion in 1998, and then contracted steadily to a value of about US$ 27 billion in 2003. Since then the global sales value has been increasing due to increased demand for food production and at the same time a reduction in available arable land. By 2012 the global sales value of crop protection products was about US$ 45 billion, and is forecasted to rise to about US$ 59 billion by 2016, due in part to the rapid rise of the Asian markets, particularly in China and India.

The demands of consumers and registration authorities for safer “greener” products, and the introduction of the new EU Directive 1107/2009 (effective from June 2011) based on hazard rather than risk, has made it more difficult and more costly for agrochemical companies to develop and register new active ingredients. It is estimated that about 70 new molecules were in development in the year 2000. By the year 2010 this number had fallen to about 30 new molecules. This change has put much more emphasis on developing new and safer formulations to maintain a competitive edge. Consequently, agchem companies have begun to concentrate their efforts on patenting new formulations with a technical or competitive advantage. Getting these new agrochemical product formulations registered as quickly as possible is absolutely critical to their profitability and is a key element of any internal justification to develop. External consultants and contract research laboratories offer the opportunity to launch activities on the critical path in parallel rather than sequentially, and hence can play a part in shortening the duration of development programmes.

The regulatory barriers to product entry and continued sale of agrochemical products are getting higher. Additional studies and assessments are required, requirements are getting tougher and in more instances higher-tier studies are needed to satisfy them. New regulations, such as REACH in the EU, asking for information on intermediates and formulated product constituents have added to the workload.

Formulation work is increasingly being outsourced to develop new safer formulations as quickly as possible with environment friendly formulation additives to satisfy registration authorities. This trend is likely to continue and to involve co-operation with contract research organisations in China and India, particularly where these bodies become GLP registered.

The effect of all these changes is demonstrated by the rapid increase in patents of new, modified, safer and more effective pesticide formulations. In some cases, notably for glyphosate formulations, the formulation additives such as surfactant adjuvants are being patented.