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DEVELOPMENTS IN APPLICATION TECHNOLOGY

Bruce Knight has had a long and distinguished career in industrial marketing in the crop protection and farm equipment industries, both in Europe and North America. In 1992 he established Innovation Management (www.innovationmanagement.co.uk), a specialist business consultancy that advises both private and public sector organisations. Bruce has a successful record of managing change and introducing new technologies which impact on food, agriculture and horticulture. **Crop Protection Monthly*asked Bruce, a regular contributor to look back over the years to November 1989 and reflect on the changes that have occurred in application technology since then.***

While it is true to say that there has been evolution, sprayer technology has certainly not undergone a revolution. Water is still the carrier and droplet dispersal is achieved by pressure through a nozzle. There have however been a few landmark steps along the way. By 1990, new enhanced application systems were still being developed and many expected these to dominate the future sprayer market, but they did not. Air sleeve sprayers were pioneered by Degania, the Israel based company. By surrounding the sprayer nozzles with a curtain of high pressure air pumped through an inflatable plastic sleeve, the spray is less vulnerable to drift, and is directed more effectively to its target - the crop. Savings of up to 30% of chemical dose rate were claimed in some situations.

Several major European sprayer manufacturers still supply air sleeve options. For example, the Hardi Twin Force and Knight, who market their own version based on a modification of the Degania boom. Degania have also introduced a special version for use in vineyards. In Britain and Northern Europe windy weather conditions are a major barrier to safe and effective spraying. With tougher legislative pressure on minimising water contamination the use of low drift systems has become even more important. However, a disadvantage of the air sleeves is that they add considerable weight to the boom and the horse power requirements are significantly increased in order to drive the air pump. They also carry a price premium. So air sleeve sprayers have never gained a major market share.

Twin fluid sprayers rely on specially designed nozzles and a separate air line which injects air under pressure into the nozzle. Droplet dispersal is such that drift is reduced and penetration into the crop enhanced. Most important of all is the fact that water volumes can be reduced by a factor of two or more. In the UK Cleanacres were the first to market a twin fluid system under the *AirTec* trademark. At their peak a market share of 10% of sales was reported in the UK and they are still favoured by a selected number of growers. The largest sprayer component company in the world, Spraying Systems, Illinois, market a similar twin fluid system, the *Airjet.*

The development of electrostatic spraying, whereby the droplets are attracted to the target crop, has always been constrained by the lack of mechanical reliability and the high price. In North America, ESS, a Georgia based company, has developed a combined air assisted and electrostatic system. Most interest appears to be for use on vineyards in California and in Chile as well as for high value vegetable crops. Spinning discs still remain the preferred method of low volume hand held application for developing country markets and for herbicide application in amenity situations.

Low drift nozzles

Tom Robinson, Syngenta's application technology manager in the UK, has seen many developments come and go. He considers the most significant change in the period has been the introduction of low drift nozzles. The landmark year was, in fact, 1990. Before then the choice was either a fan jet or hollow cone. The arrival of the Lurmark low drift, pre orifice nozzle, followed by the bubble jet from Billericay Farm Services presented the opportunity for low drift spraying and assisted the trend to lower volumes. 100 litres per hectare is now commonplace in the UK. Before 1990, 200 litres would have been the norm. These nozzles, which are now marketed by a number of manufacturers, are widely adopted. They have in effect satisfied the market need that was originally open to the enhanced application sprayers. Syngenta havs always given particular attention to application technology and has led a trend in offering product specific nozzles such as those

recommended for the fungicide *Amistar*.

Increasing sprayer size

Another trend in sprayer technology has been the increase in sprayer size and operating speed. Both have been possible as a consequence of improved boom suspension and sprayer suspension. Operating speeds of 12 to 15 kilometres per hour are now possible even with large sprayers. In 1990, 8 kilometres per hour was typical. Large self propelled units are now more and more common, based on 24 or 30 metre booms. Sprayer size, and the higher operating speed, reflects the trend to larger farm units. Booms of 36 metres are more common on large farms in continental Europe, although typical operating speeds may be lower than in the UK. The trend to larger sprayers has coincided with consolidation amongst manufacturers. Hardi and Berthoud remain leaders but the multinational agricultural equipment companies such as John Deere, Case and AGCO have also entered the sprayer sector.

Electronic control systems have not changed dramatically during the period, but they are more extensively used. The ability to switch between nozzles, or to switch boom sections on or off, all from the cab is an important benefit. This capability helps to meet legal spray control directives. Despite many efforts, direct injection of chemical into the spray line, a logical engineering development, has not made the breakthrough except for a few specialist situations. The equipment is generally too complex, and therefore expensive, given the wide range of tank mixes used, particularly in Europe.

Variable rate application

Variable rate application of granular fertiliser is now widely adopted in North America and is gaining ground in Europe, all part of a precision agriculture regime. Varying agrochemical dose rates is a more complex issue and to date the agrochemical industry has not warmed to the concept. A spin-off of precision agriculture, however, is the use of GPS. In the last two or three years, use of GPS control systems has been adopted as part of the spraying operation. With appropriate programmes it is possible to make spraying easier for the operator and to avoid overlaps. Considerable savings in chemical usage have been achieved.

What of the future? Tom Robinson believes that GPS will gain in popularity. Electronic control systems already fitted could be used much more widely than they are at present for monitoring. Demand for accurate record keeping will most probably increase and with it the potential for traceability data linked to the harvested crop. Variable rate or patch spraying is already possible mechanically. Time will tell whether the market and the agrochemical industry see a place for it.

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