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Centre for Agricultural Strategy

Agricultural and food research – who benefits?

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Poster presentation: Who benefits from Rothamsted's research on pyrethroids?

Harvey S Beck

The photostable pyrethroids are a group of highly potent insecticides which are used to kill a broad spectrum of pests in agriculture, but particularly *Lepidoptera* on cotton. They have been derived from naturally occurring plant chemicals known as pyrethrins and they are the fourth major organic insecticide class to have been discovered. The pyrethroids display high activity against a broad range of insect pests, but are, in comparison to other insecticides, safer to high mammals, the environment, and the users of the insecticide.

One of the largest of the Agricultural and Food Research Council's Institutes, Rothamsted (which is now part of the Institute of Arable Crops Research), has had a major input into the discovery of pyrethroids – three of the four pyrethroids which were first introduced into agriculture were synthesised there. Rothamsted started research in 1948 and had performed approximately one fifth of research on pyrethroids throughout the world until the first of the Rothamsted photostable pyrethroids (Permethrin) was discovered in 1972, with the others (Cypermethrin and Deltamethrin) being discovered shortly afterwards. These pyrethroids have been widely licensed by the National Research Development Corporation (now the British Technology Group). The Rothamsted research also led to benefits from photo-unstable pyrethroids but these spin-off's are ignored in analysis.

Sumitomo Chemicals of Japan were also successful in producing a photostable pyrethroid – Fenvalerate – at the same time as Rothamsted's success. After discovery of photostability many other companies started research on pyrethroids producing a wide variety of products and eroding the market share of the original photostable pyrethroids.

Figure 1
The growth of sales of pyrethroids

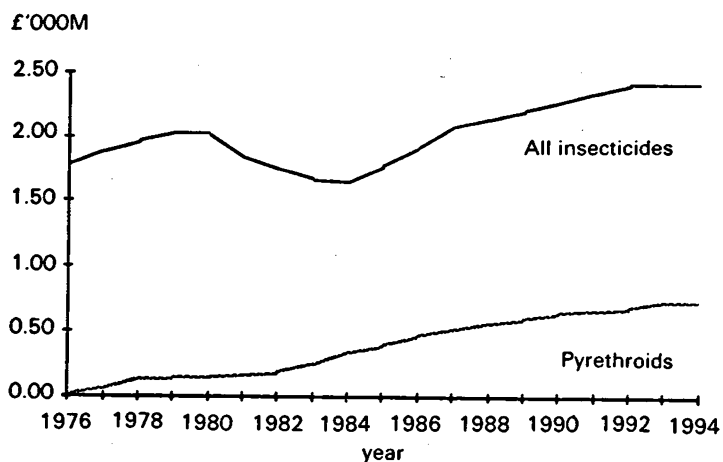
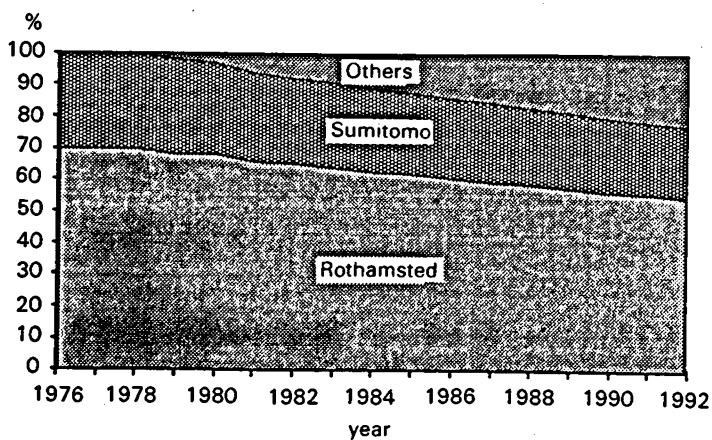


Figure 2
The share of all pyrethroid sales between Rothamsted, Sumitomo and other companies



Source: Wood Mackenzie data & this author's estimates

Analysis of the innovation at the World and UK level is illustrated in the figures below.

Figure 3
The net benefits of photostable pyrethroids to the World

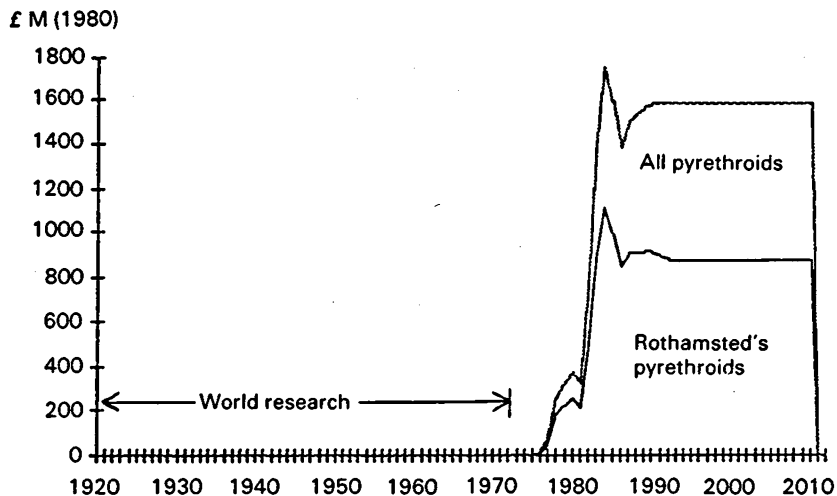
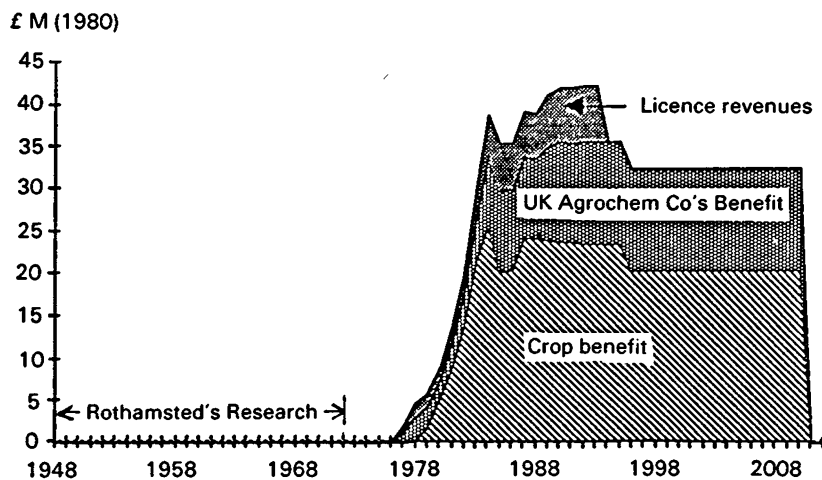


Figure 4
The benefits of Rothamsted's pyrethroids to the UK economy



On the world scale the cost of research has been very small in relation to the benefits generated. Yet, with less than one fifth of all world research on pyrethroids, Rothamsted can be considered to have 'captured' 60% of world net benefits – a tremendous achievement. However, despite, or perhaps because of, widespread licensing of the pyrethroid insecticides relatively few of world economic benefits find their way into the UK economic system. This aspect was outside the control of the researchers at Rothamsted.

While the actual direct benefits, either in the form of licence revenues, crop benefits, or benefits through UK agrochemical companies, have been relatively small, the UK system in turn benefits from research which is carried out elsewhere, eg the UK poultry industry uses a Marek's disease vaccine which was developed in the US. Viewed in this international context Rothamsted's research on pyrethroids has been particularly successful.

Finally, if national benefits could have been diverted to the UK Agricultural and Food Research system, they would potentially have been capable of sustaining about one third of all the research carried out in the system, at current levels of funding, for over 30 years.