# DEVELOPMENT OF DOUBLE-LOW RAPESEED IN UNITED KINGDOM WITH PARTICULAR REFERENCE TO GLUCOSINOLATE CONTENT

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## INTRODUCTION

Oilseed rape is not a new crop in UK but has not been important prior to its current expansion since about 1850 (Fussel, 1955). Since 1970 oilseed rape has been included as a major crop in official Census of Agriculture run each year by Ministry of Agriculture, Fisheries and Food as either rape for oilseed or rape for oil.

## DEVELOPMENT OF OILSEED RAPE IN UK

The current crop of rapeseed is almost exclusively Brassica napus; a very minor are of B. campestris may still exist in Scotland where it has fulfilled a need for a short season crop. In this latter instance the crop is spring sown but for the vast majority of UK crop, sowings occur in autumn. A precise definition of the split winter/spring is impossible due to variations in farm practice over seedrate. Moreover a small, area, thought to be in the order of 5% or less of the national crop, is grown from home-saved seed. Best estimates are therefore 90-93% of crop area as winter oilseed rape.

Basing calculations upon sales of certified seed and anecdotal evidence from the Agricultural Industry it seems probable that the harvest area for 1991 harvest will be marginally above 400,000 ha. If correct this will be an all time high.

Development of crop area by harvest year is shown below:

| | |
|---|---|
| 1970 | 4,004 ha |
| 1975 | 38,972 ha |
| 1980 | 91,760 ha |
| 1985 | 296,000 ha |
| 1986 | 299,000 ha |
| 1987 | 388,000 ha |
| 1988 | 348,000 ha |
| 1989 | 347,000 ha |
| 1990 | 397,000 ha |
| 1991 | 400,000 ha - Estimate |

Source: MAFF (Various)

The distribution of oilseed rape production in UK has changed considerably during the expansion of the crop and that in turn may explain some variation in glucosinolate content of seed. Initially the crop expanded in the South and South Midlands areas, based upon Hampshire and Northamptonshire; at that time there was no significant area of the crop in Scotland or Northern Ireland. In fact prior to 1983 the data on crop area recorded above related only to

England and Wales. Currently virtually all counties in England and Wales grow significant rapeseed areas whilst Scotland grows approximately 10% of the UK total area. Despite the widespread distribution of the crop, its intensity is highest in eastern counties. Northern Ireland has a very minor area of rapeseed.

Yields vary according to season but national average yield has been in the order of 3.0 t/ha seed in recent years.

## DEVELOPMENT OF DOUBLE LOW RAPESEED

The announcement of the Commission of the European Communities' intention to introduce a minimum quality standard for oilseed rape in terms of glucosinolate maxima during the mid-1980s has caused a total change in cultivars in production in a period of 5 years. This transition was rather longer but earlier than that in France but later than that in Western Germany (Formerly FRG).

Transition to '00' cultivars in that period was:

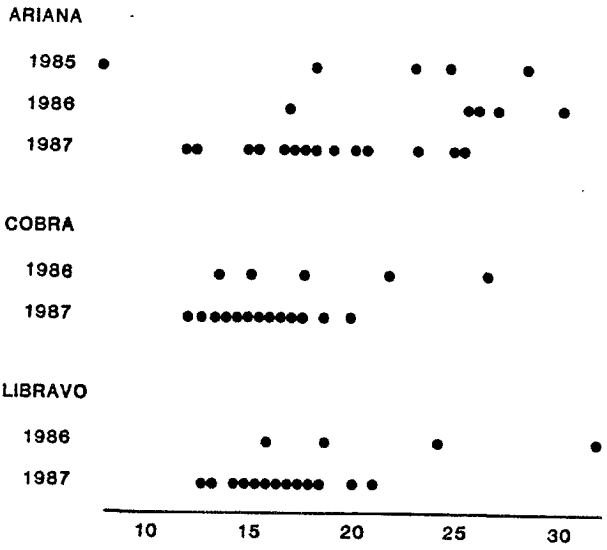
| Harvest Year | % Crop '00' | Predominant CVS |
|---|---|---|
| 1986 | < 1% | Ariana |
| 1987 | 1% | Ariana |
| 1988 | 15% | Ariana |
| 1989 | 90% | Ariana, Libravo, Cobra |
| 1990 | >95% | Lictor, Libravo, Cobra, Score |
| 1991 | 100% | Falcon, Libravo, Lictor, Cobra |

## GLUCOSINOLATE CONTENT OF UK CROPS

Virtually all cultivars grown to any extent in UK Agriculture have been tested under Recommended List procedures organised by National Institute of Agricultural Botany, Cambridge. Whilst mean glucosinolate content of seed of a given cultivar over a range of sites is quoted in Recommended Lists (NIAB, 1988; 1989; 1990) considerable variation in glucosinolate content has been noted. See Figure 1.

Similar variation was reported in Recommended List variety trials in 1989 (NIAB, 1989) and a new format for presentation of data introduced in 1990. See figure 2.

Fig 1: GLUCOSINOLATE VARIATION IN 3 RAPESEED VARIETIES IN 2 YEARS, SOURCE: NIAB 1988



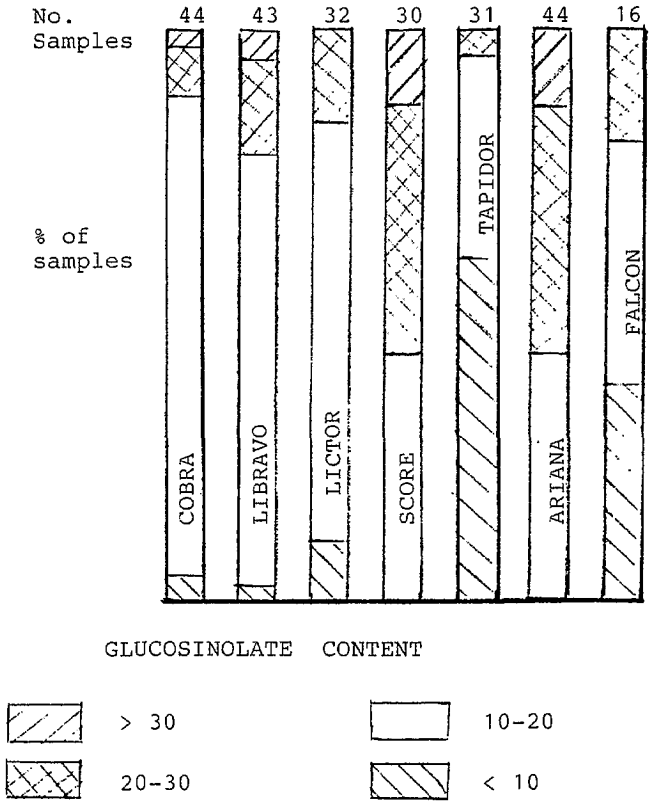

GLUCOSINOLATE CONTENT IN SEED
µm/gm @ 9% m.c.

This variation in glucosinolate content has been broadly echoed in commercial practice and whilst there has been a general trend to lower glucosinolate content in the UK crop this is in no way predictable by cultivar and certainly a large proportion of the UK rapeseed crop produces seed with greater than the proposed maximum of 20 micromoles per gram of seed at 9% moisture content. Commercial estimates for the 1990 harvest year crop are:

| GLUCOSINOLATE CONTENT µm/gm seed @ 9% m.c. | % CROP |
|---|---|
| 0 - 15 | 33 |
| 16 - 20 | 30 |
| 21 - 25 | 23 |
| 26 - 30 | 10 |
| 31 - 35 | 3 |
| > 35 | 1 |

Source: MAFF, 1991

Fig 2: GLUCOSINOLATE CONTENT OF WINTER RAPESEED VARIETIES OVER VARIOUS SITES AND SEASONS - SOURCE: NIAB 1990




ALL IN µm/hm SEED AT 9% m.c.

Experience in France (Merrien, 1991) and Germany (former FRG) (Grosse, 1991) seems to be similar to that in UK but in Denmark, where there has been a massive area increase in winter rapeseed production, suggestions are that the entire crop could fall beneath a 20 µm/gm standard (Fuglsang, 1991).

## FACTORS AFFECTING GLUCOSINOLATE CONTENT

It is generally accepted that reductions in glucosinolate content have been achieved by using the cv. Bronowski as a genetic source of low alkenyl glucosinolates. Since indole glucosinolates are therefore stable and form up to 5 µm/gm of total glucosinolate content then analyses of 0 to 5 µm/gm glucosinolate need careful investigation.

In a massive amount of experimental work it has been shown that seedrate; row width (Evans et al, 1990); nitrogenous fertiliser amount and time of application (Ogilvy, 1991) and applications of elemental sulphur (Ogilvy, 1990) have minor if any effects upon glucosinolate levels, presuming them to be applied within broad, normal agricultural practice.

However sulphur deficient areas appear to be occurring in UK, presumably as an effect of reduced industrial sulphur emissions and it is becoming clear that sulphur supplementation could be required for some crops in UK. Evans (1991) suggested some estimate of leaf sulphur in rapeseed plants could both indicate when sulphur supplementation was necessary and may be able to confirm Schnug (1989) who proposed that foliar sulphur status may be indicative of final glucosinolate content of seed.

Even so, it appears that moisture (Freer, 1988) and soil potassium status (Milford, 1991) may also affect glucosinolate status. Moreover there may be N x S interactions and possibly second order interactions of factors. These require elucidation.

## CONCLUSION

The recent rapeseed crop in UK has developed from a minor localised area in 1970 to a widely dispersed national crop by 1991. Considerable development and change has occurred to accommodate the CEC proposals for a 20 µm/gm seed at 9% m.c. standard but unfortunately many factors affecting glucosinolate content of seed are currently not fully elucidated and appear to be outwith grower control.

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