Glucosinolate Testing of Farm Saved Rapeseed in the UK 1992

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Abstract

Data derived from plot work are often criticised as being, in general, higher or lower than data recorded on farms. This year an opportunity presented itself to compare glucosinolate data obtained in official trials and in commercial practice. The results of these comparisons call into question aspects of current EC policy as applied to oilseed rape.

Background

For the 1991-2 season the EC introduced a new system for paying aid to European growers of oilseeds. The old system based on a subsidy for each tonne sold was replaced with a fixed payment for each hectare, for UK growers this represents ca 50% of the income from the crop.

In the specific case of oilseed rape a constraint was placed on growers to ensure that the glucosinolate content of the crop remained low: the Commission only pays area support to growers of approved varieties (varieties which on average, in official trials, produce glucosinolate contents of less than 25 μmole g^{-1}).

Growers using certified seed can clearly demonstrate the variety grown. However, because the new aid structure makes a substantial payment independent of yield many growers have decided to reduce costs by using farm-saved seed, which may not be so readily identifiable.

As the appeal of farm-saved seed became apparent concern was expressed that the practice could lead to increases in glucosinolate content over generations. In order to address this concern the Commission decided to permit farm-saved rapeseed to be used only if it derives directly from a crop grown from certified seed. Thus growers can only save seed for one generation. In addition growers must demonstrate that the seed saved has a glucosinolate content below 18 μmole g^{-1}. As a precaution against fraud the Commission insists that samples of farm-saved seed for glucosinolate testing are taken by 'appointed agents of the national authority' and that glucosinolate determination is carried out by 'approved laboratories'.

The National Institute of Agricultural Botany is one of the approved laboratories for the determination of glucosinolate content and has therefore been in a position to accumulate very large amounts of data on the performance of rapeseed varieties under normal agricultural conditions. Observations on these data and their implications to growers are summarised below.

Glucosinolate Contents Observed in Farm-Saved Rapeseed

The glucosinolate standard set for farm-saved rapeseed of 18 μmole g^{-1} is very demanding and inevitably this has lead to significant failure rates in the samples received (see table 1).

Table 1

Glucosinolate results for varieties in official trials and in farm crops.

Variety	No Farm Samples	Glucosinolate content: Mean from Farm Crops 1992	Mean from Official Trials 1991/2	% samples above 18 μmole
Envol	310	17	17	30.3
Falcon	352	17	16	31.3
Samourai	48	17	16	22.9
Rocket	60	19	18	48.3
Capricorn	93	17	NA	44.1
Libravo	66	20	19	62.1
Lictor	44	20	19	63.6

(Official trial means are from 44 sites harvested in 1991 and 1992).

The data in table 1 show extremely good correlation between the levels of glucosinolate in crops grown on the farm and those in official trials. The correlation is good both in terms of the magnitude of the values and the ranking of varieties. These data serve to underline the value of properly conducted variety trials as a means of predicting performance of varieties in agriculture.

Oilseed rape varieties in trial exhibit considerable variation in glucosinolate content between environments and this variation was also apparent in the farm-saved seed (see table 2).

Table 2

Ranges of glucosinolate contents observed in farm-saved rapeseed and official trials.

Variety	Ranges observed: Farm-saved Seed.	Official Trials 1991/2
Envol	7-34	9-24
Falcon	8-35	9-27
Samourai	10-32	9-31
Rocket	10-30	10-29
Capricorn	10-35	NA
Libravo	11-35	12-36
Lictor	11-35	11-28

Statistical analysis of the data shows that there is no significant difference in sample variances between farm-saved and official samples for all varieties except Envol and Falcon. This demonstrates that in most cases the ranges in farm crops are similar to those in trials. Where the ranges in farm-saved crops are larger this may be attributed to a larger sample set rather than to a tendency for glucosinolate content to be higher in the commercial situation. In fact some samples of farm-saved seed of three of the varieties were lower in glucosinolate content than the lowest figure observed with those varieties in official trials. These data would not support the hypothesis that glucosinolate content rises between generations.

Conclusion

Where glucosinolate is concerned varieties of rapeseed in agriculture perform in a manner directly comparable to that of varieties in properly conducted trials.

The 18 μmole g^{-1} standard is set near the average performance expectation of modern varieties and one would therefore expect only about 50% would pass. In this season our data indicated that ca 37% of all samples tested failed the standard. This failure rate is of particular concern to growers who have no control over the glucosinolate content of seed harvested from their land and who argue that high glucosinolate content seed does not necessarily lead to high glucosinolate content in subsequent crops. Indeed, some farmers growing seed crops find themselves unable to save part of the produce, the bulk of which will be sold to seed companies who will sell the seed back to farmers in the form of certified seed.

No-one would dispute the value of quality seed to agriculture, it has been the cornerstone of the agrarian revolution of the past forty years. However, these data suggest that variation in glucosinolate values observed are almost entirely explained by the natural variation for this character, variation over which growers have almost no control.