

QUALITATIVE AND QUANTITATIVE CHANGES DURING THE RIPENING PROCESS OF THREE WINTER RAPE CULTIVARS

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Nowadays rape is mostly harvested with combines and seeds are dried up in dryers. There is then no after harvest ripening process and the condition of seeds in which they were at the harvesting time becomes fixed. The investigations performed were aimed at finding how different quantitative and qualitative features of seeds were shaped when rape was harvested at successive 3 day intervals starting on the third day following the flowering termination of 80% flower bulk on main stems of all plants up to full maturity of all seeds. The plants were threshed in two ways, immediately after cutting and after natural drying of plants cut in the open air.

The experiments were started in 1978/79 with one cultivar, Górczański or Janpol. Since 1981/82, they have been done with three types of winter rape: high-erucic /cv.Górczański/, low-erucic /cv. Janpol/ and double low /cv. Start/. We are going to present the results of 1982 harvest only, as the weather conditions during the ripening process of rape seeds exerted considerable influence on the results, giving rise to highly significant interaction between the factors investigated and the seasons. This necessitates discussing separately the results of each season, which is hardly feasible in a short report. The results obtained in the experiment in question are well illustrative of the tendency of changes occurring in the process of rape seed ripening and make it possible at the same time to compare all the three types of rape.

The experiment was carried out at the Experiment Station of Przybroda belonging to the Agricultural

University in Poznań, situated about 30 kilometers north-west of that city.

At the time of rape ripening in 1982, i.e. in July and the first half of August the rainfalls were relatively small as compared to other years and the air temperature was high.

The seeds on the plants cut at two earliest times, i.e. 3 and 6 days after flowering termination were small and had a very high water content, so the first qualitative determinations were performed on seeds from the plants cut on the 9th day after flowering termination.

The curves drawn in the diagrams 1 to 4 are resultant from the analysis of variance and regression equation.

The 1000 seed weight was on steady increase up to 42 days following the flowering termination. Some decrease observed subsequently was probably due to the ripest and largest seeds being shed. At the earlier harvesting times the 1000 seed weight was greater when the seeds were ripening on the plants cut.

The seed weight increases of the cultivars compared were similar, the final 1000 seed weight of the high-erucic Górczański cv. being the greatest /Fig.1/.

The fat content in the seeds threshed immediately after cutting increased more rapidly than in those ripening on plants and was highest in all cultivars 27 to 30 days after flowering termination, to drop slightly and to rise again at the end of ripening. When the seeds were ripening on the plants cut, the fat content reached its maximum about 40 days after flowering termination /Fig.2/. The fat quantity contained in 1000 rape seeds depends on fat percentage and 1000 seed weight. The fat quantity increases in all the three cultivars compared were similar no matter how harvested. The increase in fat quantity stopped about 40 days after flowering termination.

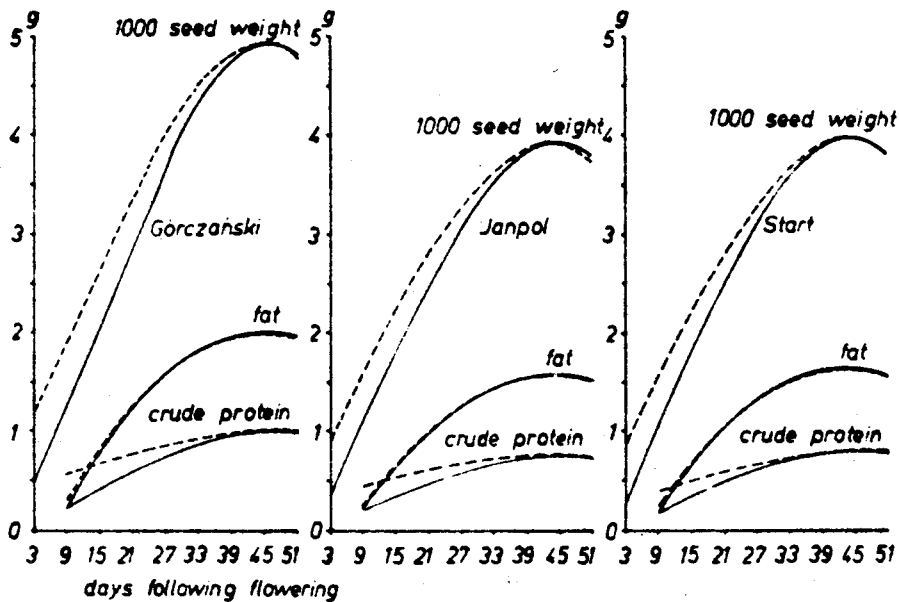
Rather interesting is the run of crude protein and true protein curves /Fig.2/. In the seeds threshed and dried immediately after the cutting of plants, the crude protein content was the same throughout the period of seed ripening. In the seeds threshed after their drying up on plants, however the crude protein content was highest when the plants were cut 3 days after flowering termination and was lowering gradually up to 30 days, to be kept up subsequently at the level approximating its content in the seeds threshed and dried immediately after cutting the plants. The true protein accumulation had a similar course. The Górc-

czański and Janpol cultivars only show a tendency to lower the content of this protein as the ripening proceeds, in either way of harvesting, while in the double low Start cv. this tendency does not appear at later times of harvesting. The true protein content in Start cv. was throughout the ripening period higher than in the other two cultivars. The increase in the crude protein quantity in seeds was relatively small during the ripening period, especially when the plants were threshed after drying up /Fig.1/.

One of the goals of the experiment was also to find out at what stage of seed maturity the rape can be harvested with combines and in two steps, i.e. cutting and threshing, without deteriorating the quality of rape seeds as raw material for crushing industry. As shown previously, the increase in 1000 seed weight, i.e. seed yield, fat content in per cent, quantity of fat accumulated came a stop about 40 days after flowering termination. At that time almost all the seeds became brown. The water content in seeds, however was over 30 per cent, which practically made it impossible to combine them without their damaging and thus deteriorating their technological value by increasing the acid number /Fig. 3 and 4/. The acid number of oil in the seeds ripening on plants was low at all harvesting times, but when the seeds were threshed and dried immediately after cutting the plants, the acid number was very high in the initial period of ripening reaching the values less than 4 only at full seed maturity. /Fig.4/.

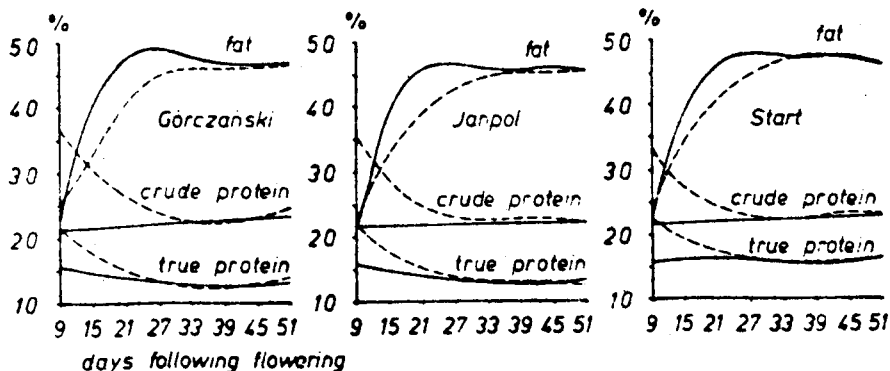
The results obtained allow to conclude as follows:

- 1/ The accumulation of fat in the seeds of winter rape comes to a stop before their reaching full maturity.
- 2/ The changes in content and amount of protein were smaller,
- 3/ When the seeds after cutting the plants mature in pods, the rape may be cut just after the increase in 1000 seed weight and fat content are terminated.
- 4/ When the seeds are threshed and dried immediately after cutting the plants, the rape may be harvested only when the full seed maturity was reached.



— threshing immediately after cutting
 --- threshing after seed drying in plants

Fig.1 The increase in 1000 seed weight, and fat and protein quantity in 1000 seeds during the ripening of 3 winter rape cultivars



— threshing immediately after cutting
 --- threshing after seed drying in plants

Fig.2 Changes in fat, crude protein and true protein contents during the ripening of 3 winter rape cultivars

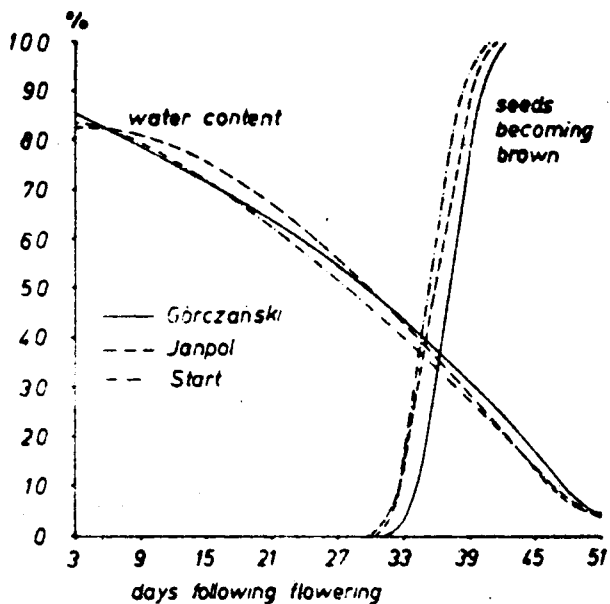
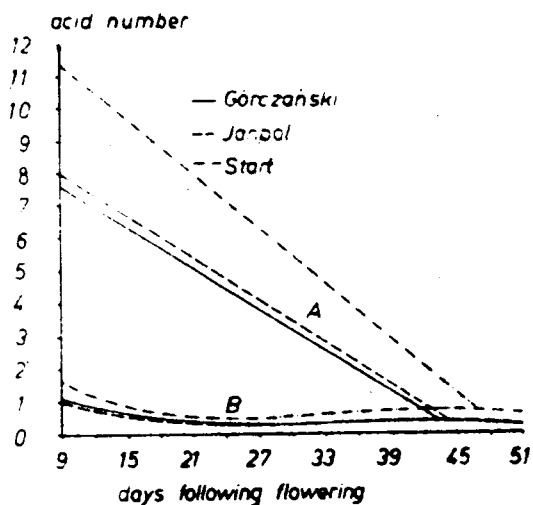


Fig.3 Changes in seed water content and seed colour during the ripening of 3 winter rape cultivars



A - threshing immediately after cutting
 B - threshing after seed drying in plants

Fig.4 Acid number of oil during the ripening of 3 winter rape cultivars