

BARANYK P., VOLF M., KAZDA J., 2001. – Organization and aims of the Union of Growers and Processors of Oilseed Crops Prague and oilseed rape growing in the Czech Republic – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 217-222.

The paper describes the origins, history, structure of membership and the position of SPZO in agricultural sector in the Czech Republic. The activities of SPZO connected with the transmission of basic scientific and technical information (mechanization, growth regulators application, herbicides, other agrochemicals, crop management and marketing) and practical applying of scientific knowledge by growers are depicted here in detail. Our union's effort is to give objective information without any commercial interests, which later serves for better choice of an optimal rape growing technology. Recently the balance of using rape and the attachment to the European market is a very important sphere. We are watching the production development of oil plants in the Czech Republic, costs and the latest changes in government sphere for supporting the bio diesel, in the context of joining the European Union. One of the principal activities of SPZO is experimental testing of various factors that influence rape growing. Among various experimental trials the most important is the semi-operating testing of varieties and consecutive showing of the results to agricultural public. These results considerably complete official small-plot testing of ÚKZÚZ (Central Institute for Supervising and Testing in Agriculture). The activity and counselling of SPZO become decisive for choosing the varieties for growing in practice.

ROSIAK E., 2001. – Domestic rapeseed market – current situation and outlook for the 2001/02 season – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 527-538.

Following two consecutive seasons of bumper crops (exceeding 1 mill tons) a decline in the production of rapeseed was observed in Poland in the year 2000. Last year's rapeseed crops totalled 958.7 thousand tons and were lower by 173.2 thousand tons or 15.3% as compared to 1999. The decline in crops resulted from a contraction of area planted (by 19.9% to 436.8 thousand ha). However, besides unfavourable weather conditions in spring (drought), rapeseed yield increased by 5.3% to 21.9 dt/ha. Decline in both production and sales resulted in increase of rapeseed prices. Average prices of lots in the third quarter of the year 2000 reached 815 PLN/t and were higher by about 30% than observed a year ago, which resulted in an improvement of profitability also in relation to grains. Nevertheless the price ratio of rapeseed to wheat still fluctuated at the level that did not assure comparable profitability for both activities. In these circumstances the area planted under the harvest of 2001 reminded almost unchanged — 380 thousand ha, i.e. slightly above the area recorded last year. Bearing that in mind the rapeseed crops in 2001 are forecast not to exceed 1 mill tons. Such level of production will not ensure full utilisation of the capacity of Polish crushers (over 1.1 mill tons). Following that, there would not be an improvement in foreign trade in oilseeds. Poland will not regain the position of main exporter of oilseeds.

ROSIAK E., 2002. – Sytuacja na krajowym rynku rzepaku – stan obecny i prognoza na sezon 2002/03 – *Polish rapeseed market – current situation and outlook for the 2002/03 season – Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 73-84.

According to final estimates of the Central Statistical Office domestic rapeseed crops totalled 1063.6 thousand tons, which was 11.0% up from the previous year and 25.6% from the average for the period of 1996–2000. The increase in crops resulted from rise in yields by 10.4% to 24.0 dt/ha as well as from a slight increase in the areas planted by 1.5% to 443.2 thousand ha. The supplies of rapeseed after the harvest 2001 exceeded domestic demand of fat industry. Because of second consecutive year of difficult economic situation two out of six large crushers did not conduct the procurement of raw material. In these circumstances there was a significant rise in rapeseed export, which for the 2001/02 are forecast at about 290 thousand tons. In spite of higher crops, exceeding domestic demand, average procurement price of raw rapeseed (with unspecified quality parameters) in the III quarter of the year 2001 amounted to 830 PLN/t, which was 2.5% higher than observed in the relevant period of the previous year. Reflecting higher prices and yields the profitability of rapeseed production increased, also in relation to grains. However such situation was not reflected in winter plantings under the harvest in the year 2002, which amounted to 390 thousand ha, i.e. 5% lower than in the previous year. If rapeseed yields in the year 2002 are lower than in the year 2001, its crops will fall below 1.0 mill tons, which would have been down by some 10–15%. Assuming that all large crushers conduct procurement and projected level of crops in the year 2002, following developments on the market are likely to occur in the season of 2002/03:

- shortage of rapeseed on domestic market, which can trigger imports,
- rise in rapeseed prices,
- Poland will loose the position of major exporter on the world market,
- rise in the negative balance of foreign trade in oilseeds.

BUDZYŃSKI W., JANKOWSKI K., 2001. – Effect of fertilization with sulphur, magnesium and nitrogen on growing and yield of white and Indian mustard seeds – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 45-58.

In the paper the effects of pre-sowing application of NPK (161 kg per ha) + S (30 kg per ha) or Mg (5 kg per ha) and top dressing N (0, 30, 25 + 5, and 60 kg N per ha) on yield components, morphological features and yield of both tested crops are compared. Supplementary of pre-sowing NPK rate with sulphur or magnesium did not affect stand architecture of both crops and their morphological features. Nitrogen top dressing (30, 25 + 5, 60 kg per ha) favourably modified height, diameter of stem base and branching of Indian and white mustard stems but plant tended to lodge. Yield bearing effects of NPKS and NPKMg on white mustard were dependent on weather conditions. When a lot of rainfalls were noted during plant flowering period application of sulphur was more effective than application of magnesium. Application of 30 kg N per ha at the start of flowering gave the best results among the methods of white mustard top dressing. Splitting of this rate into 25 kg N per ha as a solid fertiliser and 5 kg N in a solution gave the same results as application of the whole rate of 30 kg N per ha as a solid fertiliser. Rate of 60 kg N per ha appeared to be less productive. Method of pre-sowing application of NPKS or NPKMg did not differentiate the obtained yield of Indian mustard. The nitrogen applied as a solid fertiliser contributed to the increase of seed yield up to the rate of 60 kg N per ha. Yield enhancing effects of splitting of the applied rate of 30 kg N (25 as a solid + 5 kg N in the solution) was the same as one rate of solid fertiliser of 60 kg N per ha.

ZIELONKA R., SZCZEBIOT M., 2001. – Effects of some agronomic factors on *Sinapis alba* yield – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 59-68.

The paper presents the influence of sowing date, sulphur application, top dressing with nitrogen, weed and pest control on white mustard yield. Early date of sowing appeared to be effective in weed control and in limitation of the extent of injuries made by rape blossom beetle. Seed yield of early sown crop was the highest every experimental season. The delay of white mustard sowing by 3 weeks resulted in 43% decrease of seed yield. When basic mineral fertilization was applied as 180 kg of NPK (60 + 35 + 75) per ha no effects of sulphur application, top nitrogen dressing, application of trifluraline as weed control and pyrethroids to pest control on yield and its components were found.

KOTECKI A., MALARZ W., KOZAK M., 2001. – Influence of nitrogen fertilisation on development and yielding of spring rape five cultivars – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 69-80.

In the years 1999–2000 field and laboratory studies on the effects of growing rates of N fertiliser on development and yields of 5 varieties of spring rape were carried out at the experimental station in Pawłowice. The experiment in the split-plot arrangement was conducted with 2 variables, i.e.: I — cultivars of spring rape: Bolero, Licosmos, Margo, Sponsor and Star; II — N rates of 60, 90, 120 and 150 kg per ha. It was found that in the years with low precipitation and its unfavourable distribution, the cultivars examined slightly differed with respect to the beginning and the length of flowering period, silique formation, maturing and vegetation. Differences between the cultivars did not exceed 2 days. Margo cultivar formed the most siliques but it had the lowest weight of 1000 seeds, however in Star cultivar the above traits were in reverse. The highest rape yield was obtained from Sponsor cultivar followed by Bolero, Licosmos, Margo and Star cultivars. The application of 120 kg N/ha compared to the control (60 kg N/ha), significantly increased the number of siliques per plant and weight of 1000 seeds, whereas a dose of 150 kg N/ha resulted in the increase in seed yield by 19.5%. A dose of 90 kg N/ha was sufficient to achieve the highest possible seed yield for Margo, Sponsor and Star cultivars. Bolero cultivar required 120 kg N/ha and the yield growth was recorded at 150 kg N/ha with Licosmos.

KOTECKI A., MALARZ W., KOZAK M., ANIOŁOWSKI K., 2001. – Influence of nitrogen fertilisation on chemical composition of spring rape five cultivars – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 81-90.

In the years 1999–2000 the field studies on the effects of growing rates of N fertilisers on the content of crude fat and total protein in seeds and fatty acids in oil of spring rape were carried out at the experimental station in Pawłowice. The trial in the split-plot arrangement was performed with 2 variables, i.e.: I — cultivars of spring rape: Bolero, Licosmos, Margo, Sponsor and Star; II — N rates of 60, 90, 120 and 150 kg per ha. The content of crude fat and total protein depended on the cultivar, weather conditions and N fertilisation. These factors decreased the content of crude fat and increased total protein. Sponsor cultivar gave the highest yield of crude fat and total protein. As the fertilisation increased from 60 to 150 kg N/ha the crude fat yield increased by 19% and that of total protein by 25%. Star cultivar was found to contain the highest percentage of PUFA whereas Margo cultivar showed the lowest percentage. The content of erucic acid in oil varied from 0.03% (Bolero) to 0.15% (Star). The ratio of linoleic acid to linolenic acid varied from 2.20 : 1 to 2.59 : 1 and the ratio showed the highest values in Star cultivar and the lowest ones in Sponsor cultivar.

ZUKALOVÁ H., MATULA J., VAŠÁK J., 2001. – Effect of sulphur fertilization upon biomass dry matter production dynamics, and glucosinolate biosynthesis in three types of winter oilseed rape (*Brassica napus* L.) – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 273-284.

Three varieties of oilseed rape (OSR) — Lirajet line variety, its genetically modified form of Lirajet Roundup Ready (GMO), and Pronto hybrid varieties were used in a pot experiment to study the effect of increased fertilization with sulphur, the dynamics of biomass dry matter production in the course of growth and the effect upon the seed yield. Glucosinolate biosynthesis during the growth phase was also studied with the aim to determine their participation in the total content of sulphur in vegetative organs. Dry matter production during the growth phase is affected by the OSR type. The Lirajet Roundup Ready genetically modified OSR differs significantly from the others. The increasing doses of sulphur affect the yields positively, where Lirajet and Pronto varieties optimum rate is 80 kg S /ha while the transgenic Lirajet GMO is satisfied with 40 kg S/ha. The seed yield in the line variety Lirajet is 4.2% higher than the zero variant while the hybrid variety showed 8–9% and Lirajet GMO had even 17% higher results. The leaf plays the most important role in the S-uptake, as it accumulates most of the sulphur taken, and consequently it is an important indicator of its deficiency. Sulphur uptake is also affected by the OSR type when the genetically modified variety Lirajet GMO in the phase of a leaf rosette accumulates most sulphur, followed by the hybrid Pronto and the line Lirajet. Glucosinolates as secondary metabolites are a minor component of sulphur compounds. They make less than 2% of total sulphur at the start of vegetation and during the growth when their contents fall to less than 0.1%. The Pronto variety contains the largest amount of glucosinolates.

KRAUZE A., BOWSZYS T., 2001. – Effect of time of sulphur fertilization of spring oilseed rape cv. Star on seed yield, sulphur content and crude oil – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 285-290.

A three-year field experiment with spring oilseed rape cv. Star was conducted on a soil lessives, class IIIa. Sulphur was applied as  $(\text{NH}_4)_2\text{SO}_4$  at three dates: preplant, top dressing and as foliar application. A dose of sulphur amounted to 12 kg/ha. There were stated significant favourable differences in the seed yield and content of S in the leaves, stems and straw between the control object and sulphur treatments, independently of the time and way of application. The sulphur fertilization improved the nutritive value of oilseed rape increasing significantly PUFA ( $\text{C}_{18:2}$  and  $\text{C}_{18:3}$ ) in it. The results obtained indicate the usefulness of sulphur fertilization of spring oilseed rape.

WIELEBSKI F., WÓJTOWICZ M., 2001. – Effect of sowing density on seed yield, morphological plant character and yield structure of open pollinated cultivars and composite hybrids of winter oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 349-362.

The purpose of the investigations, carried out in 1998–2000, was to explain the influence of plant population density on seed yield, yield components and compensation ability of new cultivars of oilseed rape. Four open pollinated cultivars (Bor, Marita, Kana and Sylvia) and the composite hybrid (Synergy in 1998 and POH 798 in 1999, 2000) were investigated. Studying seed yield, significant interaction between sowing density (40–160 seeds per sq. m) and cultivars was demonstrated. Sowing density of 40 seeds per sq. m. was sufficient for Bor while Marita achieved the highest yield at the sowing of 120 seeds per sq. m. Other cultivars had the highest yield at the sowing density of 80 seeds per sq. m. Among investigated yield components the character most susceptible to plant population density was the number of pods per plant. Values of this feature were negatively correlated with plant population density and positively with the number of branches per plant. The number of branches was negatively correlated with plant population density. The least changeable yield component was the number of seeds per pod. Significant correlation between the number of plants per area unit and the number of pods per plant was not stated. Plant population density significantly affected the morphological character of hibernating and harvested plants. The increase of plant density caused significant reduction of the number of leaves per rosette and the diameter of root collar and less affected the elevation of shoot apex. Weather conditions during autumn had significant effect on values of these morphological characters of hibernating plants. Rosettes of hybrids had more leaves and greater diameter of root collar and higher elevation of shoot apex in comparison with open pollinated cultivars. Winterhardiness was negatively correlated with the elevation of shoot apex and the number of plants per area unit before winter and positively with the diameter of root collar. There was not significant correlation between wintering and number of leaves per rosette. Plant population density before harvest was negatively correlated with the number of branches, plant height and lodging of plants, while positively with height of the lowest branch.

WIELEBSKI F., WÓJTOWICZ M., 2001. – Effect of main agrotechnical factors on yield and yield structure of oilseed rape composite hybrids. I. – Effect of sowing density and percentage of pollinator plants on yield and yield structure of oilseed rape composite hybrids POH 595 – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 363-380.

The effect of sowing rate (70, 140, 230 seeds per sq. m.) and percentage of pollinator seeds in sowing mixture (5, 10, 20, 30, 40, 50%) on survival rate and development of pollinator plants in a canopy of  $F_1$  hybrid plants was evaluated. Synthesis of two series of field experiments carried out in 1997/98 and 1998/99

in three experimental stations of Plant Breeding and Acclimatization Institute: Borowo, Łagiewniki, Oleśnica Mała is presented. The subject of this study was non-restored hybrid POH 595 composed of hybrid FP01 and pollinator variety — Bor. The highest yield was achieved at the sowing rate of 70 seeds per sq. m. and 20–40 per cent of pollinator seeds in sowing mixture. The difference in yields resulted from the influence of investigated factors on yield structure of non-restored hybrid components. Plant density mostly affected the number of properly developed pods. Both male sterile plants and pollinator plants at the sowing rate of 70 seeds per sq. m. produced the greatest amount of pods and were characterized by the highest percentage of properly developed pods. These pods produced more seeds and were characterized by the highest weight of 1000 seeds. Sowing rate had not significant effect on quality of harvested seeds. Hybrid composition: 70 per cent of seeds of male sterile F<sub>1</sub> hybrid plants and 30 per cent of seeds of pollinator plants ensured adequate amount of pollen to plant pollination during flowering and warranted high pod production with high quality seeds characterized by high content of oil and low content of glucosinolates. Significant difference between yield components of pollinator and male sterile plants was noticed. Male sterile plants produced more pods with fewer but bigger seeds. Moreover these plants were characterized by higher percentage of properly developed pods, were higher and had more branches. Sowing rate significantly affected the morphological character of plants before winter and the number of branches and height of both pollinator and male sterile plants in spring. With the increase of sowing rate plants had fewer branches and were smaller. Survival of pollinator plants mainly depended on sowing rate. The increase of sowing rate caused the decrease of pollinator plant percentage because pollinator plants were more suppressed by more competitive male sterile plants.

WÓJTOWICZ M., WIELEBSKI F., 2001. – Effect of main agrotechnical factors on yield and yield structure of oilseed rape composite hybrids. II. – Response of oilseed rape composite hybrid POH 495, POH 595 to sowing date and spring nitrogen fertilization – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 381-396.

Two series of field experiments in split-plot design were carried out in three Experimental Stations of Plant Breeding and Acclimatization Institute: Borowo, Łagiewniki, Oleśnica Mała in 1997/98 and 1998/99. Obtained results indicate significant effect of sowing date and spring nitrogen fertilization on yield of composite hybrids POH 495, POH 595. 7 days delay of sowing after optimum sowing date influenced significant seed yield decrease of two investigated cultivars. Increase of spring nitrogen dose from 80 to 160 kg N/ha caused significant increase of seed yield. Percentage of composite hybrid components — pollinator plants and male sterile plants in yield creation was dependent on nitrogen fertilization. At higher nitrogen dose, importance of male sterile plants in yield creation increased at the cost of pollinator plants. Yield of investigated cultivars did not differ significantly because it was mainly dependent on plants of FP01 hybrid, which was a component in two cultivars. Experimental factors had significant influence on yield structure of pollinator plants and plants of FP01 hybrid. Irrespective of sowing date and spring nitrogen dose male sterile plants of FP01 create more branches and pods with smaller number of seeds than pollinator plants. Sowing date had not significant effect on seed quality of composite hybrid, while higher nitrogen dose (160 kg/ha) significantly increased protein content and decreased fat content.

WIELEBSKI F., WÓJTOWICZ M., 2001. – Effect of main agrotechnical factors on yield and yield structure of oilseed rape composite hybrids. III.– Effect of seedbed nitrogen application on height, wintering and yield of oilseed rape composite hybrid POH 495 and POH 595 – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 397-408.

Significant effect of seedbed nitrogen fertilization at 20-40 kg N/ha, in comparison with control object, on the increase of yield of investigated composite hybrids of oilseed rape was stated. Seedbed nitrogen doses affected morphological character of hibernating plants. Higher fertilized plants had more leaves, greater diameter of root collar, higher elevation of shoot apex and greater fresh matter. Mild winters during years of investigations made full estimation of nitrogen dose influence on oilseed rape wintering impossible. Seedbed nitrogen application affected pod production of both pollinator and male sterile plants and had not an effect on other yield components (the number of seeds per pod and the weight of 1000 seeds) and morphological plant character (the number of branches, the height of harvested plants). Among investigated pollinators strain MAH 15 was more suppressed by hybrid plants than variety Bor while an autumn nitrogen dose had no effect on their survival. Glucosinolate, oil and protein content in seeds of investigated composite hybrids was not dependent on seedbed nitrogen doses. Significant difference in glucosinolate content between cultivars was noticed. Seeds of hybrid POH 495 were characterized by higher content of glucosinolate and higher percentage of more harmful alkenyl glucosinolate than seeds of hybrid POH 595.

WAŁKOWSKI T., 2001. – Influence of sowing date and sowing rate on the yields of spring rapeseed varieties: open pollinated variety Star and composite hybrid Margo – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 409-422.

Three-years field experiment concerning the influence of seed sowing rate, sowing date and the use of osmoconditioning of sowing seeds on yielding of spring oilseed rape was carried out in 1999 and 2000 year.

Open pollinated variety Star and composite hybrid Margo were tested. In field trial was used sowing material prepared by conventional and stimulating means (osmoconditioning seeds). Yielding of Star variety was better than composite hybrid Margo in the both locations. Average yields of Star and Margo at Małyszyn were 22.1 dt/ha and 20.8 dt/ha, and at Zielęcín were 18.7 and 16.8 dt/ha respectively. Sowing of spring rape 15 days later had significant influence on reductions seed yields. Sowing time (early and two-week delayed) as well as seed sowing rate (80, 120, 160 and 200 seeds per 1 m<sup>2</sup>) had statistically significant effects on seed yield of tested varieties. At Małyszyn and at Zielęcín Experimental Station the highest yields were obtained under combination 160–200 seeds per 1 m<sup>2</sup> and early sowing time and 120–160 seeds per 1 m<sup>2</sup> and early date of sowing, respectively. Osmoconditioned seed material led to emergence of plants earlier (2–4 days) than sowing establishment of other plots planted with non-stimulating seed material. It has been stated that seed advancement had better effects on field emergence in comparison with non-stimulating seed material. More uniform and more complete emergence in different conditions leading to better plant density per 1 m<sup>2</sup> after germination and close to harvest, and as the result of this the increase of yielding of tested varieties were observed.

ZUKALOVÁ H., MATULA J., KUČTOVÁ P., MIKŠÍK V., 2001. – Influence of sulphur on the yield and quality of winter oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 587-596.

The demand of oilseed rape for sulphur was observed by increased rates of S in form of ammonium sulphate (SA 40, 80, 120, 160 kg S/ha), in spring application. Hydro Sulfan (HSF) fertilizer was included into the trial which is the optimum nutrient need adapted for a plant. It contains N in immediately nitrate form (50%) and the next 50% is in less impressive ammonium form. This balancing fertilizer manifested quick growth after the beginning of spring vegetation activity, which positively exhibited the yield of biomass and seeds. The rate 40 kg S/ha in form of HSF, applied in spring can be compared with the production of biomass with the rate of 160 kg S/ha in form of ammonium sulphate. Seed yield increases with the increased rates of S. The highest is at 160 kg/ha dose as ammonium sulphate, but does not reach the yield at 40 kg S/ha as HSF. Oil content at the variant with HSF is also higher in comparison with the next doses S as ammonium sulphate. Glucosinolates increased about 10% at the variant with HSF, which can not threaten quality of oilseed rape for their low content.

ZAJĄC T., KULIG B., 2001. – Estimation of the effect of selected agro technical factors on linseed cropping in 3<sup>4-1</sup> experiment – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 597-608.

A strict field experiment was carried out with linseed, Opal cv. in 1999 on degraded chernozem developed from loess. The 3<sup>4-1</sup> experiment comprised 27 plots in three blocks. The first factor plot comprised 3 levels of mineral fertilization NPK: 90, 180 and 270 kg/ha. Three sowing densities of germinating linseeds: 600, 900 and 1200 seeds/ m<sup>2</sup> were the second factor, whereas the nitrogen proportion in the fertilizer dose was the third. The fourth factor included foliar application of growth retardant (Promalin) and foliar fertilizer (Tytanit). Under favourable soil and climatic conditions brown linseed, Opal cv. yielded over 2 tons per hectare. Linseed yielding on this level allows considering it as an alternative oil crop and the area sown with it should be enlarged. Linseed yield components were not diversified significantly as the effect of studied agro technical factors. Calculated simple correlation coefficients for the linseed yield and its components reveal a weak relationship among these features.

WIELEBSKI F., WÓJTOWICZ M., HORODYSKI A., 2002. – Agrotechnika rzepaku ozimego w badaniach Zakładu Roślin Oleistych IHAR w Poznaniu – *Agronomical practices of oilseed rape in investigations of Department of Oilseed Crops of Plant Breeding and Acclimatization Institute in Poznań – Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 31-52.

The paper describes main investigations referring to agronomical practices of winter oilseed rape carried out in the Department of Oilseed Crops of Plant Breeding and Acclimatization Institute in Poznań. In Poland, investigations dealing with oilseed rape have been carried out for 50 years. Careful investigations concerning the development and requirements of winter oilseed rape under the leadership of Professor Felicjan Dembiński were started in the beginning of the 1950s. On the basis of many experiments performed in the 1960s the rules of cultivation and fertilisation of traditional oilseed rape varieties were developed. Introduction of integrated agronomical practices into production caused significant increase of oilseed rape yield and was contributive to increase this plant cultivated area. The subject of investigations dealing with agronomical practices in the last 30 years was determined, in great part, by breeding achievements. Progress in breeding led to the creation of new, better yielding oilseed rape types which were characterised by improved oil and meal composition. They could have different requirements what induced cultivation experiments in order to develop the best cultivation systems for newly created varieties. Investigations of agronomical practices were performed together with breeding work. Thanks to this, in initial stage of breeding work, breeding material was examined in cultivation experiments. These experiments were undertaken in order to establish the biological conditions of yielding of new oilseed rape varieties, their response to some environmental factors and agronomical practices. The results of these experiments were used to develop the integrated cultivation technology of low erucic acid varieties and next doubled improved

and hybrid varieties. Taking modern agronomical practices requirements into account enabled breeding of varieties well fitted for Polish soil-climate conditions.

WAŁKOWSKI T., HORODYSKI A., 2002. – Wprowadzanie do praktyki nowych kompleksowych technologii produkcji roślin oleistych wraz z ulepszonymi jakościowo odmianami – *Introduction into practice the new full cultivation technology of oilseed crops together with varieties of improved quality* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 53-60.

Introducing into practice the new cultivation technologies of oilseed crops was preceded by the research works on their individual elements. These works were conducted by Department of Oilseed Crop Production Technology and Extension Works of IHAR, in co-operation with some research institutions in the country. Introductions into practice were done on similar way. The main role in these works had co-operation with agronomic service of oil mills, which acted for the benefit of rapeseed producers. Laboratory of oilseed crop Production Technology is now also engaged in popularising activity in co-operation with editorial offices of agricultural scientific and popular magazines. The Laboratory itself is publishing oilseed crop monographs, instructions and leaflets for farmers.

TYS J., JANKOWSKI K., 2002. – Wpływ technologii uprawy i zbioru na jakość nasion rzepaku ozimego – *Effect of method of growing and harvesting on seed quality of winter oilseeds rape* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 85-94.

In the paper the effects of methods of winter oilseed rape growing (of different level of inputs and methods of harvesting) on some features of seeds are presented. In the estimation of seeds the following properties were taken into consideration: weight of 1000 seeds, content of crude oil and crude protein, acid number, peroxide number and test of oil point. It was found that method of growing did not differentiate content of crude oil in winter oilseed rape seeds (this value ranged between 40.0 and 40.9 per cent of dry matter). Used method of seed production significantly affected the level of crude protein accumulation and chlorophyll content. Increase of intensity of inputs was accompanied with increase of total protein (by 1.6–1.8 per cent of dry matter) and of chlorophyll (3 fold more) contents. It was concluded that technological properties of winter oilseed rape was affected by harvesting method. When harvesting was performed with one-stage method seeds contained more protein by 0.2–0.8 per cent and 5 fold more chlorophyll. Method of winter rape growing affected physical properties of seed (which indicate ability of long lasting storage) at lower extend compared to effect caused by method of harvesting. Method of harvesting significantly affected mechanical resistance of seeds. Seeds harvested in two stages method showed reduced resistance (lower power caused oil extraction) compared to one stage harvesting.

RUDKO T., 2002. – Próba zastosowania skrobi do ograniczenia podatności łuszczyń rzepaku na pęknięcie – *Attempt of starch application to reduce oilseed rape siliqua cracking* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 113-118.

Siliqua cracking and seed shedding of oilseed rape is the cause of seed losses from 3 up to 20% of the crop. The study concerns the use of starch water solutions as glue impregnation preparations and their influence on siliqua resistance to cracking. The following chemicals were spread on plants and evaluated: potatoe starch, maize starch, cold water soluble of maize starch, tapioca starch and rice starch. It was stated that water solution of starch increased cracking resistance of rapeseed siliques. The force required to open a siliqua (breaking of seam) was from 11 to 118% bigger in comparison to untreated siliques.

MARKUS J., OSTROWSKA D., ŁOBODA T., PIETKIEWICZ S., LEWANDOWSKI M., 2002. – Reakcja rzepaku jarego odmiany Star na gęstość siewu i nawożenie mineralne – *Reaction of cultivar Star of spring oilseed rape on sowing density and mineral fertilization* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 129-140.

The field trials with cultivar Star of spring oilseed rape registered in 1996, were conducted in Experimental Station of Warsaw Agriculture University at Ursynów during 1997-1998. The effect of 2 levels of both sowing densities and NPK fertilization on the crop gas exchange, seed yield, its structure and chemical seed composition was investigated. Differentiation of sowing densities of 80 and 160 seeds per 1 m<sup>2</sup> (3.5 i 7.0 kg ha<sup>-1</sup>) did not affect significantly the levels of seed and fat yields, as well as on fat and glucosinolate contents. Sowing density much profoundly affected plant density per 1 m<sup>2</sup> as well as the height of first branch forming. The effects of sowing density and fertilization upon stomatal conductance of spring oilseed rape also was determined. Analyzed agronomical factors did not affect significantly photosynthetic intensity, whereas NPK fertilization itself distinctly modified stomatal conductivity and thus gas exchange. NPK fertilization was the factor which exerted the strongest influence on yielding ability of this species. Doubling rate from 144,5 to 289 kg NPK ha<sup>-1</sup> (ratio NPK – 1 : 0.2 : 0.8) caused yield increase by 11%, as well as fat yield (from 1570 to 1725 kg ha<sup>-1</sup>).

SZCZEBIOT M., 2002. – Effect of mineral fertilization on yielding of spring false flax and crambe – *Wpływ nawożenia na plonowanie lnianki jarej i katranu abisyńskiego – Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 141-150.

In the paper the effects of fertilization on yield and its components of two studied species are compared. The following treatments were taken into consideration: pre-sowing NPK (125 kg ha<sup>-1</sup>) + S (25 kg ha<sup>-1</sup>) or + Mg (5 kg ha<sup>-1</sup>) and top dressing with nitrogen (0, 20, 35+5, 40 kg N ha<sup>-1</sup>). It was found that sulphur and magnesium application together with NPK did not affect yield of false flax and crambe. The highest yield of false flax (2.14 tons ha<sup>-1</sup>) was noted for treatment with split nitrogen rate of 80 kg. The method of nitrogen application (as solid urea or in solution) did not affect crop yield. The best yield of crambe was obtained when 50% of the total nitrogen rate (40 kg ha<sup>-1</sup>) was given before sowing and the second half as 35 kg in solid urea + 5 kg as urea solution.

## Breeding

KUČERA V., VYVADILOVÁ M., 2001. – Recent state and trends in breeding of winter rapeseed in the Czech Republic – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 5-12.

Activities of research and breeding organizations cooperating in association “Czech Rapeseed” are oriented to increase effectiveness of breeding procedures in winter oilseed rape using innovative methods. The aim is to produce initial breeding materials possessing high parameters of seed quality and seed yield, disease resistance and frost tolerance. Lines, hybrid materials and advanced doubled haploid lines with improved double low quality are used for the development of genotypes with desired biological and agronomic traits. Initial materials for hybrid breeding, i.e. our original self-incompatible doubled haploid lines, Ogu-INRA CMS lines and their male fertility restorer lines from France and CMS lines Shaan 2 from China have been obtained. Yellow-seeded oilseed rape created by means of interspecific hybridization has been used as a donor of specific traits of seed quality. Initial materials are homozygotized using doubled haploids produced by microspore culture. Innovation in seed quality analyses aims at screening for low glucosinolate content, especially by NIRS method. Frost tolerance laboratory tests of rape plants are performed and selection method in vitro is being developed. Disease resistance tests, especially against *Phoma lingam* and *Sclerotinia sclerotiorum* are provided in laboratory and in field conditions and on infection fields. Molecular fingerprinting based on AFLP technique will be used for the identification of lines and determination of hybridity degree.

ADAMSKA E., SZAŁA L., KOŁODZIEJ K., CEGIELSKA-TARAS T., 2001. – Estimation of winter oilseed rape DH lines for several traits on the basis of experiments carried out at two environments – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 13-26.

The paper contains the results of statistical analysis of winter oilseed rape doubled haploids (DH) performed on the basis of experiments carried out at two places. 32 DH lines and parental forms (DH O-120 and DH C-1041) as well as control variety Kana were compared together or individually for chosen traits: several seed yield components, seed yield per plot, oil content and fatty acid content. The results of the study showed significant differences (at the level  $P = 0.01$ ) between places and between the DH lines (mean value for two places). For several seed yield components, seed yield per plot and oil content genotype × environment interaction was significant. But for fatty acid content the interaction did not appear. It was possible to select DH lines better than parental forms and control variety Kana for studied traits.

NAWRACAŁA J., 2001. – Efficiency of flowering of varied soybean (*Glycine max* (L.) Merrill) genotypes in the environmental conditions of Wielkopolska – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 27-44.

During three year experiment observations of effectiveness of flowering of 38 different soybean genotypes were carried out. Early, determinate genotype had small number of flowers, on main stem mainly. These genotypes had higher efficiency of flowering, compared to late genotypes, which had a lot of flowers. The latest variety (maturity group IV) had the lowest pod setting (below 10%) and the highest variability ( $V = 134.6\%$ ). The highest (35.9%) and the most stable ( $V = 24.1\%$ ) efficiency of flowering was characteristic for Swedish variety Fiskeby V. This variety and lines PI 194 639 and PI 196 529 may be useful as starting material for breeding in Wielkopolska environmental conditions.

PIĘTKA T., KRÓTKA K., KRZYMAŃSKI J., 2001. – Study on combining ability in respect to glucosinolate content in F<sub>1</sub> and F<sub>2</sub> generations of winter rapeseed hybrids (*Brassica napus* L.) – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 303-314.

This study was undertaken in order to establish the general and specific combining abilities (GCA and SCA) in respect to glucosinolate content in seeds collected from F<sub>1</sub> and F<sub>2</sub> hybrid generations of winter double low rapeseed. Hybrids were produced by crossing of double low varieties: Mar, Polo, Silvia, Lirajet and Wotan with inbred lines extremely low in glucosinolate content. Hybrids were grown in field trials. Harvested seeds

were analysed for glucosinolate content and composition. Analyses were performed using gas-liquid chromatography of silylated desulfoglucosinolates. Calculations of GCA and SCA were performed in North Caroline'a II (N II) design. GCA and SCA values and statistical tests of their significance were calculated separately for F<sub>1</sub> and for F<sub>2</sub> generations and then compared to each other. Calculated GCA values showed that both inbred lines and varieties were highly and significantly differentiated according to glucosinolate content and composition. Thus it can be expected that effective selection for lower glucosinolate content will be possible in segregating populations of hybrids. Possibility of making use of SCA in improving glucosinolate content was smaller. Calculated values are significantly different from zero only for a small part of combinations and in many cases positive values found in F<sub>1</sub> were changed to negative in F<sub>2</sub> generation or inversely. Examined varieties and inbred lines were not differentiated genetically according to 4-hydroxybrassicin content.

BABULA D., KACZMAREK M., ZIÓLKOWSKI P., SADOWSKI J., 2001. – Genetic and physical basis of chromosomal organization in selected species from *Brassicaceae* family – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 315-326.

Comprehension of plant genome structure and function has developed as an effect of advances in construction of genetic, cytogenetic and physical maps followed by recent completion of *Arabidopsis thaliana* genome sequencing program. Fast developing bioinformatics and techniques of genome mass analysis facilitate the determination of genetic basis of differentiation among higher plant species and characterization of genes involved in many biological processes. Aspects of comparative genomics in relation to model system of related species: *Arabidopsis thaliana* and genus *Brassica* are discussed.

SPRINGER B., WOJCIECHOWSKI A., 2001. – Cross compatibility in the crosses between *B. napus*, *B. oleracea* and *B. campestris* – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 327-334.

The reciprocal crosses between four genotypes of *B. napus* with *B. campestris* and *B. oleracea* were attempted with the objective to find out crossability between them. The observations of pollen germination and penetration of pollen tubes into style were made. Generally 730 cross pollinations were made in 16 cross combinations. The biggest crossability was observed when *B. napus* cultivars were used as a female parent in all cross combinations. *B. napus* showed higher cross compatibility *B. campestris* than with *B. oleracea*. In the cross *B. napus* with *B. oleracea* unilateral cross compatibility has been observed.

POPLAWSKA W., BARTKOWIAK-BRODA I., LIERSCH A., FÜRĞUTH A., 2001. – Evaluation of qualitative traits of restorer lines for CMS *ogura* and its usefulness for the development of F<sub>1</sub> restored hybrids of winter oilseed rape (*Brassica napus* L.) – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 335-348.

The lack of restorer lines with appropriate qualitative and agronomical traits was the factor limiting the utilization of CMS *ogura* system in breeding of restored hybrid varieties of double low winter oilseed rape (*Brassica napus* L.). Restorer gene has been introduced to the rapeseed genome from radish genotype (*Raphanus sativus*) (Heyn 1976). Obtained recombinants were characterized by strong linkage of restorer alleles with genes determining high glucosinolate content. Investigations of double low restorer lines for CMS *ogura* in F<sub>5</sub> – F<sub>6</sub> generations are presented. These lines were selected from crossings between low glucosinolate male sterile lines CMS *ogura* (4.1–11.8 µM/g of seeds) and starting restorer line R with glucosinolates content of about 60 µM/g of seeds. Selection of genotypes with restorer gene alleles was carried out on the phenotypic expression of this trait and with the use of isozyme marker PGI-2. Results of the evaluation of yielding ability and quantitative traits for restorer lines of CMS *ogura* in F<sub>5</sub> and F<sub>6</sub> generation are presented. Also usefulness of these restorer lines for F<sub>1</sub> restored hybrids of winter oilseed rape development was discussed. About 84% of 178 restorer lines selected from F<sub>6</sub> progeny were characterized by glucosinolate content below 15 µM/g of seeds. The PGI-2 marker was lost in nearly half of the investigated F<sub>6</sub> progeny. It indicates that the use of PGI-2 marker in selection for low glucosinolate restorer lines in low glucosinolate populations was not effective. The yielding ability of the best investigated restorer line was not significantly different as compared to standard variety Lisek.

BARTKOWIAK-BRODA I., LIERSCH A., OGRODOWCZYK M., POPLAWSKA W., 2001. – Glucosinolate content in sowing and consumption seeds of hybrid varieties of winter oilseed rape with CMS *ogura* cytoplasm – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 423-440.

Complete stable expression of male sterility in CMS *ogura* is an advantage to this system. However, the lack of genotypes possessing restorer genes for CMS *ogura* in *Brassica napus* species made the breeding of restored hybrid varieties impossible. The restorer gene originating from radish (*Raphanus sativus*) introduced into the winter rapeseed genotype was tightly linked with genes determining high glucosinolate content. As a result of crosses with low glucosinolate CMS *ogura* lines and selection the restorer lines with differentiated glucosinolate content have been obtained. Investigations conducted with 66 experimental F<sub>1</sub> hybrids aimed at determining of the influence of glucosinolate content in restorer lines on the content of these compounds in hybrid seeds progeny F<sub>1</sub> and in consumption seeds. Obtained results showed that glucosinolate content in

hybrid seeds of F<sub>1</sub> progeny is not conditioned by glucosinolate content in father restoring pollinator lines, whereas this dependence occurs in F<sub>2</sub> progeny, that is in consumption seeds. Therefore to obtain consumption seeds of rapeseed meeting Polish standard, the breeding of restorer lines with very low glucosinolate content is necessary.

ZAJĄC T., BOROWIEC F., MICEK P., 2001. – Comparison of productivity, chemical composition and fatty acid profile of yellow and brown linseeds – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 441-454.

The amount of linseed yield, its structure and chemical composition were investigated in field experiments carried out in 1998–2000. The brown linseed Polish Opal cv. was compared with yellow linseed Hungarian Gold cv. The size of leaf and stand area of linseed were diversified mainly by the growing years. Leaf area index of stand at the flowering stage only very slightly determined the linseed cropping. Yielding of linseed cultivars, which differed by their seed colour, was very similar and depended mainly on two structural traits, i.e. shoot density and the weight of 1000 seeds. Under favourable soil conditions of southern Poland the linseed yield of about 2 tons per ha may be recommended for cultivation as a alternative oil-bearing crop, whereas the obtained seed yield, due to its chemical composition, may be used as food. Opal cv. has higher content of crude protein but lower content of fat in comparison with Hungarian Gold cv. The choice of oily linseed cultivars has bigger influence on fatty acids profile than the year of cultivation. Favourable fatty acids proportion is characteristic for the Hungarian Gold cultivar.

TROCZYŃSKA J., FLASIŃSKI S., DROZDOWSKA L., 2001. – *Agrobacterium tumefaciens*-mediated transformation of rapeseed with green fluorescent protein gene – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 569-578.

Hypocotyl explants excised from 5-7 day old seedlings of *Brassica napus* cv. Bor were transformed with *Agrobacterium tumefaciens* strain ABI containing a binary plasmid pMON30069 with the neomycin phosphotransferase gene (NPTII) and the green fluorescent protein gene (GFP) driven by P-e35S promoter from cauliflower mosaic virus. After 24 h co-incubation with *Agrobacterium* the explants were transferred to the shoot inducing medium (MS salts, vitamins B5, AgNO<sub>3</sub> 5 mg/l, BAP 2 mg/l, ZEA 0.5 mg/l, GA<sub>3</sub> 0.01 mg/l). Shoots regenerated from hypocotyl calli were transferred to the elongation medium (MS salts, B5 vitamins). Shoot inducing medium and elongation medium contained 20 mg/l kanamycin for selection of transformed cells and 500 mg/l carbenicillin to control *Agrobacterium* growth. Microscopic evaluation of GFP fluorescence was used to monitor the transformation. The GFP expression under blue light was detected in 2.3% of rapeseed shoots obtained from transformation.

BĄCZKIEWICZ B., ŁUCZKIEWICZ T., RUDKO T., 2001. – Variability of pod shattering resistance in post irradiated population of winter oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 579-586.

Pod shattering makes great yield losses in winter oilseed rape; in average 10–15%. In this paper variability of pod resistance to shattering in post irradiated winter rape population is presented. The method used for evaluation of this trait was proposed by Rudko (2000). In this method force needed to crash the pod was measured when peduncle on the base of pod was bending. Pod resistance to shattering was analyzed within the plant as well as between the families selected from post irradiated population. Variability coefficients of this trait for single plants range from 6.2–65.2%, and for strains from 20.9–47.1%. Significant ( $\alpha = 0.01$ ) correlation coefficients between force necessary to crash the pod and rostrum length ( $r = 0.17$ ), pod length ( $r = 0.25$ ) and pod diameter ( $r = 0.31$ ) were calculated.

BARTKOWIAK-BRODA I., 2002. – Wzajemny związek postępu w agrotechnice i hodowli rzepaku ozimego – *Reciprocal relationship between progress in agronomical practices and breeding of winter rapeseed* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 61-72.

The magnitude and quality of the yield obtained from rapeseed varieties in specific agroclimatic conditions do not depend only on their genotype but also on proper agronomical practices. The breeding of new types of varieties (zeroerucic, double low, hybrids) is based on rapeseed genotypes with large genetic modifications. These transitions induced changes in the techniques of field crop production. Also the increase of cultivation area, progress in investigations on rapeseed agronomical practices and necessity of environment protection give rise to new tasks for breeding. The paper presents the history of genetic and breeding investigations on rapeseed in Poland and in the world, their influence on the change of agrotechnics requirements of this plant and new breeding tasks indispensable for the application of modern agronomical practices.

## Weed-Control

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FRANEK M., 2001. – Reacting of six winter oilseed rape cultivars to herbicides applied post sowing and post emergence – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 91-96.

In investigations the reaction of winter oilseed rape cultivars: Bermuda, Kana, Liropa, Lisek, Silva and Wotan to 9 herbicides containing clomazone, metazachlor, alachlor, dimethachlor, napropamide, propyzamide, benaloline and cropyralid or their mixtures was evaluated. The experiments on 2 types of soil (the heavy – black soil and the light – brown soil) were established. Negative reactions such as control of height, decrease of yield or weight of 1000 seeds for some of winter oilseed rape cultivars were observed. Mixture benazoline + clopyralid applied after winter oilseed rape emergence damaged almost all cultivars, particularly on light soil.

FRANEK M., ROLA H., 2001. – Effects of weed control in winter oilseed rape with the herbicide Colzor Trio 405 EC in lower Silesia conditions – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 97-102.

During 1999–2000 in the Institute of Soil Science and Plant Cultivation – Dept. of Ecology and Weed Control the efficacy of weed control in winter oilseed rape of Colzor Trio 405 EC (a.i. dimethachlor, clomazone and napropamide) was evaluated. The phytotoxic effects of herbicide on winter oilseed rape were not observed. Weed species: *Apera spica-venti*, *Anthemideae*, *Capsella bursa-pastoris*, *Chenopodium album*, *Descurainia Sophia*, *Galium aparine*, *Lamium amplexicaule*, *Lamium purpureum*, *Thlaspi arvense*, *Stellaria media*, *Veronica persica* were well controlled by herbicide Colzor Trio 405 EC. *Viola arvensis* was moderate susceptible and *Fumaria officinalis* was resistant. The yield and weight of 1000 seeds assembled from the herbicide objects were higher in comparison with the check.

BADOWSKI M., FRANEK M., ROLA H., 2001. – Evaluation of new graminicides for grass weeds control in winter oilseed rape crop – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 103-106.

During 1998–2000 in the Department of Ecology and Weed Control of the Institute of Soil Science and Plant Cultivation in Wrocław efficacy of new graminicides Fusilade Forte 150 EC and Aramo 050 EC for grass weeds control in winter oilseed rape was evaluated. Fusilade Forte 150 EC and Aramo 050 EC applied in the rates 1.0–1.5 l/ha were good to eliminate Voluntare cereals and in the rates 2.0–3.0 l/ha controlled *Elymus repens* effectively. The phytotoxic effects of herbicides Fusilade Forte 150 EC and Aramo 050 EC on winter oilseed rape were not observed.

STACHECKI S., PARADOWSKI A., PRACZYK T., 2001. – Susceptibility of winter oilseed rape to fluroxypyr – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 107-112.

The possibility of the use of fluroxypyr to weed control in winter oilseed rape in spring application was studied in two seasons 1998/99 and 1999/2000. The field experiments were established in winter oilseed rape cv. Lirajet as a randomised block in 4 replications. The fluroxypyr (Starane 250 EC, 250 g a.i. /dm<sup>3</sup>) was applied at doses 100 g, 150 g, 200 g, 300 g a.i./ha in early spring during leaf development and formation of side shoots growth stage (growth stage GS 19/29) and in late spring during inflorescence emergence growth stage (GS 50). In spite of temporary foliar symptoms, fluroxypyr applied at 100–150 g a.i./ha in spring after the beginning of vegetation during 19/20 GS was safe for winter oilseed rape plants. Fluroxypyr applied later in 50 GS caused high fitotoxicity effect on the winter oilseed rape crop.

MURAWA D., PYKAŁO I., WARMIŃSKI K., 2001. – Oil, its acid composition and protein content in seeds of white mustard cultivars Nakielska and Borowska treated with herbicides from 1999 harvest – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 259-264.

The aim of investigation was the estimation of the influence of herbicides treatment on some quality features of white mustard seeds cv. Nakielska and Borowska. The following herbicides were used: Triflurotox 250 EC in dose 3,5 dm<sup>3</sup>/ha, Alatrif 380 EC — 4,0 dm<sup>3</sup>/ha, Butisan 400 SC — 3,0 dm<sup>3</sup>/ha, together Butisan 400 SC — 3,0 dm<sup>3</sup>/ha and Lontrel 300 — 0,3 dm<sup>3</sup>/ha, and Comodor 72 EC — 4,0 dm<sup>3</sup>/ha. The obtained results showed higher protein content in seeds of Borowska cultivar while Nakielska cv. was characterized by higher fat level. Participation of saturated, monounsaturated and polyunsaturated acids in oil from white mustard seeds was dependent on plant varieties. The protein content as well as fat content in seeds of both varieties were different after application of investigated herbicides. The applied herbicides affected the share of saturated acids and oleic acid in oil from seeds of both varieties.

WARMIŃSKI K., MURAWA D., ADOMAS B., PYKAŁO I., 2001. – Oil and protein content in seeds of conventional spring rape variety Star and complex hybrid variety Margo cultivated in 1999 year depending on applied pesticides – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 265-272.

The effect of plant protection agents applied to spring rape c.v. Star and Margo on quality of seeds was investigated. Plants were treated with the following chemicals: Mechanical weed control and Decis 2,5 EC; Roundup Ultra 360 SL and Decis 2,5 EC; Butisan 400 SC and Decis 2,5 EC; Butisan 400 SC and Ronilan 500 SC; Butisan 400 SC, Ronilan 500 SC and Decis 2,5 EC; Ronilan 500 SC and Decis 2,5 EC. Fat content in seeds and sum of saturated fatty acids (SFA) in oil seeds of both investigated varieties were on similar levels. These values were 48% d.m. and 7% respectively. The difference was noted in the content of polyunsaturated fatty acids (PUFA), i.e. 31.5% for Star c.v. and 29.5% for Margo c.v., monounsaturated fatty acids (MUFA), 64.5%, 64.0% respectively and total protein in seeds, 23.6% d.m., 24.3% d.m. respectively. The effect of plant protection agents on seed quality of spring rape was not observed.

SETA G., DRZEWIECKI S., MRÓWCZYŃSKI M., 2001. – Effectiveness of combined application of insecticides and foliar fertilizers in control of some pests in oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 139-146.

The pollen beetle (*Meligethes aeneus* F.) and cabbage stem weevil (*Ceutorhynchus pallidactylus* Marsh.) are the most frequent pests in winter rape in the region of Upper Silesia, where the investigations were conducted. Relinquishment of these pests control can provide up to 15–50% loss of yield. In 1998–2000, in the Institute of Plant Protection in Poznań, Sośnicowice Department, investigations were conducted to find out what kind of insecticides recommended to pollen beetle and cabbage stem weevil control, used as a tank-mix application with foliar fertilizers are the most efficient in control of these pests and can bring the biggest net profit. The examined insecticides — Bancol 50 WP, Bulldock 025 EC, Decis 2,5 EC, Fury 100 EW, Karate 025 EC, Karate 100 CS, Mospilan 20 SP, Nurelle D 550 EC, Ripcord Nowy 050 EC, Trebon 10 EW were applied separately and jointly with foliar fertilizers — Basfoliar 36 Extra, Basfoliar 12-4-6, Basfoliar 34, Ekolist PK, Insol B, Insol PK + urea, Mikrosol R + urea, Solubor DF, Wuxal TOP N. These investigations have shown that application of some tank-mixed mixtures of insecticides and fertilizers as the effective control of the pollen beetle and cabbage stem weevil, enlarged the yield of winter rape seeds. In some cases, application of insecticides with particular foliar fertilizers in one spraying operation permits the production cost of winter rape to be appreciably reduced.

WÓJTOWICZ M., WÓJTOWICZ A., 2002. – Uszkodzenia rzepaku ozimego przez szkodniki w okresie wiosennym w latach 1999–2001 – *Damage of winter oilseed rape caused by pests feeding in spring in 1999–2001 – Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 119-128.

In 1999–2001 the damages of winter oilseed rape caused by pest feeding in spring was estimated. Significant differences between provinces and years were noticed. The difference of pest damage between provinces was larger than between years. Analysis of variance of pest damages showed that space variability in case of cabbage stem weevils, cabbage seedstalk curculio and pollen beetle was responsible for about 70% of total variability and 45% regarding cabbage seed weevil and cabbage seed midge. Oilseed rape was most damaged in the following provinces: warmińsko-mazurskie, lubuskie and łódzkie. In 1999 the damage of plants was lower than in 2000 and 2001. Space variability of oilseed rape damages most likely resulted from more intensive or faint protection of plantations in particular provinces.

## Diseases

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SADOWSKI CZ., JANKOWSKI K., ŁUKANOWSKI A., TRZCIŃSKI J., 2001 – Effect of sowing date on the health status of spring oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 113-120.

In 1996–1999 the health status of spring oilseed rape sown in early date (the date of spring cereals sowing) and 3 weeks later was compared. The occurrence of diseases was evaluated in the phase of flowering and ripening. The main disease occurring in a high intensity was pod spot (*Alternaria* spp.). The symptoms were visible on the leaves, then on shoots and pods. Significantly higher occurrence of the symptoms was observed on the plants sown earlier. Additionally, downy mildew (*Peronospora parasitica*) was observed in its quite high intensity and the powdery mildew (*Erysiphe cruciferarum*) in the last two years of the experiment. During three years were noted only few plants with the symptoms of sclerotinia rot (*Sclerotinia sclerotiorum*) and dry rot (*Phoma lingam*). These pathogens are classified as the most dangerous for winter oilseed rape in Poland.

KOPRINA R., 2001. – Dynamics of occurrence of winter rapeseed pests in the Czech Republic in the years 1990 – 2000 – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 121-126.

The aim of this work was to evaluate the dynamics of winter rapeseed pests in the Czech Republic in the years 1990–2000. The first occurrence of pollen beetle *Meligethes aeneus*, *Ceutorhynchus napi* and *Ceutorhynchus quadridens* depended on the sum of active temperatures over 10°C only, the increase of rapeseed sowing area did not correlate to the first occurrence of these pests. Area protected against *C. napi* and *C. quadridens* increased proportionally to the increase of area under the rapeseed crops. The occurrence of pod insects (*Ceutorhynchus assimilis* and *Dasyneura brassicae*) was partially dependent on the percentage of protected area under the rapeseed and also on sum of active temperatures. Area treated against pod pests (*Ceutorhynchus assimilis* and *Dasyneura brassicae*) partially depended on the sum of active temperatures during several years. Only occurrence of aphids did not correlate to any observed indicators.

MAĆZYŃSKA A., GŁAZEK M., KRZYZIŃSKA B., BANACHOWSKA J., 2001. – Occurrence of winter oilseed rape pathogens in 1999 and 2000 years – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 127-138.

Field studies were carried out in 1998/1999 and 1999/2000 vegetations seasons in the Institute of Plant Protection, Branch Sośnicowice to estimate the occurrence of fungal disease in winter oilseed rape. Diseases assessments were made fortnightly through the whole vegetation season. Severity of *Leptosphaeria maculans* (Desm.) Ces. Et de Not./*Phoma lingam* (Tode) Desm. *Phoma lingam* and *Alternaria spp.* was recorded as percentage area affected. During the flowering period the percentage of plants of winter oilseed rape attacked by *Sclerotinia sclerotiorum* (Lib.) de Bary, and after pods setting the percentage of cover of *Alternaria spp.* and *Botrytis cinerea* Pers. on the pods were assessed. In 1999 the occurrence of disease was high. This year was characterized by high rainfall in spring and flowering period of winter oilseed rape. This weather condition increased the development of *Alternaria spp.* and *S. sclerotiorum*. Warm autumn in 1999 was conducive to spread disease of winter oilseed rape, especially dark leaf spot (*Alternaria spp.*). In the spring of 2000, pathogens were found in high densities because of soft winter. In 2000, the development of the pathogens on the leaf positions was almost completely inhibited by the absence of rainfall in April. Pods of winter oilseed rape in the beginning were nearly in good health. A dry period was broken by rainy period at the end of vegetation, in July. Dark pod spot (*Alternaria spp.*) and grey mould (*B. cinerea*) were able to spread on pods. The efficiency of fungicides depends on time of their application. The analysis of climatic factors (rainfall and temperature) and the estimation of fungal diseases occurring on winter oilseed rape afford possibilities for using fungicides at the best time.

STARZYCKA E., STARZYCKI M., PSZCZOŁA J., 2001. – Obtaining of pure *Sclerotinia sclerotiorum* (Lib.) de Bary isolates from contaminated sclerotia – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 455-462.

Pure cultures of different fungi species are necessary for many DNA investigations, also for polymorphism checking of *Sclerotinia sclerotiorum* (Lib.) de Bary. To receive such pure cultures, plants susceptible to mentioned pathogen and originating from interspecific crosses were used. Stem fragments of plants were cloned and then inoculated with the pathogen using newly worked out method. Purification method was based on the process of re-isolation of *S. sclerotiorum* mycelium from upper part of stems previously infected with mixture of unidentified fungi and bacteria, which were obtained from preliminary isolation from sclerotia. With this method isolates free of contamination were obtained, and the presence of the fungus *S. sclerotiorum* was confirmed by microscope observation of sclerotia and molecular marker RAPD method.

KAROLEWSKI Z., WEBER Z., NAJDER K., 2001. – Different cultivars of winter oilseed rape infection by *Pyrenopeziza brassicae* Sutton et Rawlinson in conditions suitable for epidemic development – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 463-468.

In field plot experiment in four repetitions occurrence of light leaf spot (*Pyrenopeziza brassicae*) on 13 cultivars of winter oilseed rape was assessed. The pathogen inoculum was distributed on each plot after sowing in the form of 50 cm long 5 pieces of debris of oilseed rape plants from last year plantation, on which pathogen was observed. Symptoms of the disease on 25 plants of each plot in successive growth stages (6–8 leaves, bud developing, flowering, ripening) were evaluated. In bud developing and flowering growth stages, in cultivars Leo, Mar, Marita and Polo the highest numbers of winter oilseed rape plants with infected leaves were noted. In flowering and ripening growth stages in the same cultivars also the highest numbers of plants with infected stems were found. The medium disease occurrence both on leaves and stems was found in cultivars Bor and Kana. Remaining 7 cultivars (Bermuda, Bolko, Lirajet, Liropa, Lisek, Silvia, Wotan) appeared to be in the least degree infected.

WEBER Z., 2002. – Skuteczność biopreparatu Contans WG (*Coniothyrium Minitans* Campb.) w ochronie rzepaku ozimego przed *Sclerotinia sclerotiorum* (Lib.) de Bary – *Efficacy of biopreparate Contans WG (Coniothyrium Minitans Campb.) in winter oilseed rape protection against Sclerotinia sclerotiorum (Lib.) de Bary* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 151-156.

The efficacy of biopreparate Contans WG (*Coniothyrium minitans*) and fungicide Alert 375 SC (flusilasole + carbendazim) in winter oilseed rape Lirajet protection against *Sclerotinia sclerotiorum* was evaluated in field experiment, conducted in completely randomised block design in four replicates. Biopreparate Contans WG was used before sowing into soil, and fungicide Alert 375 SC during flowering of oilseed rape. Both, biopreparate Contans WG and fungicide Alert 375 SC to similar and statistically significant degree decreased oilseed rape infection by *S. sclerotiorum* and resulted in higher yield than in check.

## Analysis

NOGALA-KAŁUCKA M., GOGOLEWSKI M., MUŚNICKI CZ., 2002. – Changes of tocopherol and plastochromanol-8 contents during growth of the spring oilseed rape plant (*Brassica napus* L.) – *Zmiany*

zawartości tokoferoli i plastochromanolu-8 podczas wzrostu rzepaku jarego (*Brassica napus* L.) – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 157-164.

Recently numerous studies have concerned the biosynthesis of chromanols and tocopheryloquinones in cells of various green plants as this can be of crucial importance for their occurrence in seeds, particularly those of oil plants. The present study focused on determination of the changes in tocopherol content in selected green parts and flowers of the oilseed rape plant during growth and in ripe seeds. During growth of the Star variety (spring rapeseed, 00 type) parts of the plant were collected (leaves, buds, flowers, pods) and lyophilized. Then the samples were analysed on the contents of tocopherols and plastochromanol-8 using TLC and HPLC. Occurrence of all four homologous forms of tocopherols as well as plastochromanol-8 (PC-8) was stated. Alfa-tocopherol and gamma-tocopherol were the most abundant compounds observed. Delta- and beta-tocopherol occurred in smaller quantities. The presence of plastochromanol-8 was found in all samples. Varying quantities of tocopherols and plastochromanol-8 identified in individual samples may indicate a possibility of these compounds biosynthesis from lower forms by introducing methyl groups in the free positions of the chromanol ring.

MICHALSKI K., 2002. – Oznaczanie morfiny w dojrzałych pustych makówkach za pomocą NIRS dla potrzeb prac hodowlanych – *Measuring of morphine content in ripe empty poppy capsules by NIRS method for breeding purposes* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 207-212.

Seeds of medicine poppy and low morphine poppy are widely used in food industry. Although the low morphine varieties were introduced some years ago, it is still necessary to control growing plants due import of fertile poppy seeds from abroad. The aim of the study was testing the opportunity of applying of NIR method for morphine estimation. 200 samples were used as calibration set ranging in morphine content from 0.02% to 2.46%. Calibration covering full range, although with good correlation coefficient ( $R = 0.95$ ) and standard error (SEC = 0.13), was too rough for low morphine varieties, thus additional calibration for range 0.02–0.12% was calculated (SEC = 0.008,  $R = 0.85$ ). The results of the second calibration qualify it as a screening method for breeding purposes for low morphine content.

## Technology

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JERZEWSKA M., PTASZNIK S., 2001. – Characteristics of some domestic margarines and „mix” type products as regards the variability of fatty acids composition – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 223-238.

Selected 11 fresh samples of soft margarines, mainly with low erucic rapeseed oil blend and 2 „mix” type margarines with milk fat addition, from domestic producers, were taken to evaluate their variability of fatty acids composition. The share of saturated acids, geometrical and positional mono- and polyunsaturated acids in products was estimated by GLC analysis. It was observed that the *trans* isomers of  $C_{18:1}$  make 89–97% of total TFA in conventional margarines (from 60% fat and higher) and 50% in low caloric ones (from 50% fat and lower). No statistically significant differences in the estimation of products were observed, but reversely to the assortments. From statistical analysis results that standard deviation (SD) for total saturated FA varied 21.6–29.2%, for total TFA there was 1.1–6.9%, for total unsaturated FA relatively 66.6–70.9% and 0.25–1.5% for erucic acid. In the unsaturated FA group the lowest variability coefficient 0.41–10% was observed. In relation to 1995th the proportion of total SFA to  $C_{18:1}$  and to  $C_{18:2} + C_{18:3} = 1 : 1.5 : 1.3$  is more profitable. The comparison of presented investigation to the foreign once shows its conformity or somewhat better results.

PASTUSZEWSKA B., DAKOWSKI P., JABŁECKI G., BURACZEWSKA L., OCHTABIŃSKA A., ŚWIĘCH E., MATYJEK R., TACIAK M., 2001. – Effects of toasting rapeseed meal and heating defatted rapeseed cake on their protein value determined in vitro and in vivo – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 241-246.

Protein value of 8 rapeseed meals toasted in varied conditions and 6 defatted rapeseed cakes processed in laboratory were evaluated using in vitro methods and in tests with rats. The extension of toasting time from 49 to 55 min decreased protein dispersibility and solubility in KOH and sodium borate. It did not affect protein digestibility value in vitro and in vivo but decreased biological value and net protein utilization in rats. The increase of toasting temperature decreased protein solubility and dispersibility in meals heated during shorter time but did not affect these indices in meals heated longer. Among in vivo parameters only protein digestibility was affected by toasting temperature and was the lowest in the meal heated in the lowest temperature. Raising temperature of heating rapeseed cake in the laboratory from 90 to 140°C resulted in the decrease of all measured parameters in vitro and in vivo.

KRASUCKI W., TYS J., GRELA E.R., SZAFRAN K., 2001. – Chemical composition of rapeseeds stored under conditions simulating the industrial silos – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 247-258.

The aim of this study was to evaluate changes in the contents of crude protein, fibre and its fractions, crude fat and fatty acid profile, glucosinolate levels, acidic number, peroxide and anisidinic values, and chlorophyll levels in winter rapeseeds of Bolko and Marita varieties in relation to their storage conditions (temperature, humidity, pressure degree and duration of storage). The results showed a non-significant effect of storage conditions on the changes in levels of proximate nutrients in the seeds. It has been documented, however, that the storage conditions affected significantly the composition of fatty acids, C<sub>18</sub> in particular. There was a substantial increase in the contents of oleic (C<sub>18:1</sub>) and hypercholesterolemic (mystyric C<sub>14:0</sub> and palmitic C<sub>16:0</sub>) fatty acids, whereas the levels of essential unsaturated fatty acids (linoleic, C<sub>18:2</sub> and linolenic, C<sub>18:3</sub>) declined. The greatest changes in fatty acid profile were noted during the storage of seeds at the temperature of 30°C and humidity of 11%. Therefore, these storage conditions imposed the most unfavorable changes accounted for determining the technological value (elevated acidic number and peroxide value) and nutritive quality of seeds.

ROTKIEWICZ D., MURAWA D., KONOPKA I., WARMIŃSKI K., 2001. – Technological value of spring rapeseed after treatment with different combinations of plant protection agents – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 291-302.

The effect of some combinations of herbicides, insecticides and fungicides on the selected technological parameters of two varieties of spring rapeseed was investigated. Mass of 1000 seeds, their size, content of impurities, amount of protein and fat, share of non-polar, glyco- and phospholipids in total fat and fatty acids composition of non-polar lipids were analysed. It was observed that combinations with both herbicides: Butisan 400 SC and Roundup Ultra 360 SC had unfavourable influence on quality of spring rape seeds. The combinations decrease the mass of seeds and change the proportions of fatty acids, decreasing the content of unsaturated acids. Combination: Butisan 400 SC + Decis 2.5 EC + Ronilan 500 SC increases also the content of impurities, especially in green seeds.

MIERZEJEWSKA D., KUBICKA E., JĘDRYCHOWSKI L., GRABSKA J., 2001. – Changes of specific activity and immunoreactivity of lipase during storage of rapeseed – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 469-476.

Lipid fraction quality of rapeseed stored is dependent on a number of factors including — among others — stored seeds moisture. In the experiment activity and immunoreactivity of lipase in stored rapeseed with moisture 6 and 10% was investigated. It was found that enzyme activity of stored rapeseed with 10% moisture content ranged to higher extent (from 18.73 to 55.85 A.U./mg protein) and contrary, enzyme immunoreactivity ranged to lesser extent (from 4.55 to 9.68 mg immunoreactive protein) as compared to rapeseed with 6% moisture content. It was found that high specific activity did not correspond with high immunoreactivity during storage of rapeseeds with either 6 or 10% moisture content.

RUDZIŃSKA M., KAZUŚ T., WĄSOWICZ E., 2001. – Sterols and their oxidized derivatives in refined and cold pressed seed oils – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 477-494.

The goal of this work were identification of oxidation products of campesterol, stigmasterol and  $\beta$ -sitosterol using GC/MS technique and determination of their content in plant oils both refined and cold pressed. The following oils purchased at local shops were analyzed: olive, rapeseed, soy, sunflower, corn oils cold pressed and refined and cold pressed flax oil. The content of phytosterols was determined using GC method after sample saponification. For the determination of oxyphytosterols saponification process was replaced by transesterification, followed by sample clean-up on SPE-NH<sub>2</sub> cartridges. Cleaned samples were derivatized (silylated) and analyzed by GC/MS. Based on our findings rapeseed and corn oils both refined and cold pressed were the ones with the highest in phytosterols contents. For the identification purposes a mixture of oxidized campesterol,  $\beta$ -sitosterol and stigmasterol derivatives obtained by appropriate phytosterols standards heating was used. Utilized analytical methods enabled the determination of phytosterols oxidation products (POP) in plant oils. POPs were present in each sample but their contents in refined oils was 2–2.5 times higher than in cold pressed ones. The lowest levels of oxyphytosterols were detected in cold pressed rapeseed oil 7.83  $\mu$ g/g of oil and the highest in refined sunflower oil — 48.76  $\mu$ g/g of oil. Epimers 7-hydroxy-phytosterols and 7-keto-phytosterols were predominant group in cold pressed oils whereas epoxy derivatives were predominant compound in refined oils. Percentage composition of oxyphytosterol fraction differed from phytosterol percentage fraction.

RYBACKI R., SKAWIŃSKI P., LAMPKOWSKI M., 2001. – Technical status of rapeseed drying facilities in ZT Kruszwica area of seed supply – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 539-550.

The domestic fat industry, being concerned about the high quality of its products, is forced to evaluate thoroughly the quality of the purchased raw materials. Thorough quality evaluation of the rape seeds leads to the conclusion that the biggest decrease in the technological value is reported during the cleaning, drying and

storage of seeds. Rapeseeds is a very difficult material for the after-harvest processing due to their structure and chemical composition. Even small irregularities may considerably decrease the technological value of the seeds as well as the quality of the final products. In order to eliminate any prospective irregularities, there were 371 seed drying facilities audited at the end of 2000 and beginning of 2001. During the audit special attention was paid to the machines i.e. the year of production, types, technical condition, source of energy, use of heat exchanger, temperature during seeds drying and the ways of their registration. Rape seeds storage is the last element of the so called after-harvest processing. The optimum conditions of humidity, temperature and storage life are very important as rape seeds are extremely susceptible to mould development, self-heating and seed lumping that might decrease the quality or even eliminate such seeds as raw material for the production of edible oils.

JĄSKIEWICZ T., MATYKA S., 2001. – False flax (*Camelina sativa*) in mixed feeds for broiler chickens – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 623-630.

108 Hybro broiler chickens divided into 3 groups were reared in laboratory environment. 5% (group II) or 10% (group III) extruded false flax seeds were added to isoaminoacid and isoenergy mixed feeds. The performance parameters for broiler chickens obtained in group I fed on fat supplemented soybean meal-based diets and groups II and III fed on the diets with the use of extruded false flax seeds were similar.

TYS J., SUJAK A., RYBACKI R., 2002. – Wpływ temperatury suszenia na zawartość barwników w nasionach rzepaku ozimego – *Drying temperature-induced changes of the seed pigment components of the winter oilseed rape* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 95-102.

The objective of this paper was to specify the influence of different temperatures of seed drying (80–180°C) on the the pigment components of the seeds of oilseed rape. The research on the colour of the oil both pressed and extracted from the rape seeds treated with the different drying temperatures show its influence on the chlorophyll as well as the carotenoid content. Application of the higher drying temperature resulted in the growth of both chlorophyll and carotenoid pigments contents in oil. The smallest amount of pigments has been found in the control seeds which have been dried at a room temperature. Interestingly, at the respectively high drying temperature almost no carotenoid pigments have been found probably due to their temperature-dependent degradation what caused the increased absorbance at short wave length. Characteristic absorbance evaluated with standard method according to the BN-86 8030-30 has been always higher than evaluated with Rayleigh method. The temperature of 120°C seems to be the highest safe drying temperature for seeds because its exceeding results in the temperature-dependent formation of free radicals. The significant amount of carotenoid pigments is being thus lost what influence the oil nutritional quality, because carotenoids are vitamins precursors.

KOZŁOWSKA H., TROSZYŃSKA A., ZIELIŃSKI H., BUCIŃSKI A., LAMPARSKI G., 2002. – Wykorzystanie nasion rzepaku do produkcji kiełków jadalnych – *The use of rapeseeds for sprouts production in human nutrition* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 165-174.

Seeds of double low oilseed rape of Mango variety were subjected to a 8-day germination in a conditioning cabinet, at a temperature of 25°C and moisture content of 95%, without light. Every day, the content of particular glucosinolate (GLS) was determined by the HPLC method. Sprouts were evaluated for their sensory quality after 4 days of germination by the sensory profile method as well as in the terms of consumer's quality. Sensory characteristics of rapeseed sprouts was compared with that of radish sprouts. The HPLC analysis indicated that the content of dominating aliphatic GLS, including progoitrin and gluconapin, decreased already after 4 days of germination (after this time, the sprouts were ready-to-eat), while the content of indolic GLS was rising gradually along with the time of the germination process. Of four indol GLS, only 4-hydroxyglucobrassicin was an exemption as its content decreased, similarly to the content of the sole aryl GLS – gluconasturtin. The results of consumer's evaluation indicated that rapeseeds sprouts met the quality requirements of consumers to a smaller extent than radish sprouts. In a 10-point scale, they obtained 4.6, while the radish sprouts – 6.9. Sensory profile indicated that rapeseed sprouts, compared to radish sprouts – evaluated higher by the consumers, were characterised by a less intensive colour, lower intensity of vegetable flavour, and lower intensity of taste characteristic for Cruciferae seeds, i.e. pungent /acid, after-taste, and mustard.

SZUKALSKA E., HAZUKA Z., PAWŁOWICZ R., 2002. – Uwodornienie oleju sojowego i rzepakowego na katalizatorach miedziowych promotorowanych niklem i tlenkiem glinu – *Hydrogenation of soybean and rapeseed oil with copper catalysts activated with nickel and aluminium oxide* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 175-186.

The aim of this research was to study the new copper catalysts activated with nickel. The catalysts (product of Puławy Institute of Chemical Fertilizers) are especially made for hydrogenation of linolenic acids in vegetable oil. Industrially bleached soybean and rapeseed oils were hydrogenated in a 'dead end' type laboratory-scale reactor, which allowed for automatic registration of absorbed hydrogen. The process temperature was 200°C. The ratio of copper to nickel of the catalysts used ranged from 1 : 0,0036 – 1 : 0,018

(w/w). The catalysts also contained  $\text{Al}_2\text{O}_3$  as the structural activator. The copper concentration of the Cu catalyst was 1% Cu in relation to the hydrogenated oil, whereas the concentration of mixed catalysts were 0,5 and 1% Cu. Based on the hydrogenation kinetic curves, the reaction rate constants were determined. For partially hydrogenated oil samples, the composition of fatty acids and *trans* isomer contents were determined by gas liquid chromatographic and ultra-violet spectrophotometric methods, respectively. The following parameters were also determined: linolenic selectivity ( $s_{3/2}$ ), specific *cis-trans* isomerization and filtration constants. The latter characterized the rate of filtering the catalyst from oil. From the results of these investigations, it was affirmed that nickel activated copper catalysts have significant influence on the kinetic and chemistry of reaction. The reaction rate constant increased with the increase in nickel concentration in the catalyst, so, an increase in the catalyst activity was observed. As a result, this allowed to reduce the catalyst concentration in the oil. However, this occurred at the cost of a decrease in selectivity  $s_{3/2}$ . The decrease was relatively small especially for soybean oil and was depended on nickel concentration in the catalyst. At higher nickel concentration, the decrease in the linolenic selectivity was higher, the level of CLA was lower and specific *cis-trans* isomerization was higher. The rate of filtration increased with the increase in nickel concentration.

## Oil

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OSEK M., JANOCHA A., KLOCEK B., WASIŁOWSKI Z., 2001 – Influence of feed mixtures containing different fats on production coefficients and meat quality of slaughter chicken – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 153-164.

The aim of this research was the comparison of influence of mixtures greased with soya oil, rapeseed oil or with loose fodder fat "Erafet" on rearing results and quality of meat of broiler chickens. This study was carried out on 3 groups of Hubbard chickens reared for 39 days. The factor differentiating the groups was mixtures starter and grower, which for the first group (OS) was greased with soya oil (5%), the second (OR) — rapeseed oil (5%), and the third (E) — with loose fodder fat "Erafet" (6%). It was shown, that greasing the mixtures for slaughter chickens with soya oil, or rapeseed oil allowed to obtain very good productive results. "Erafet" turned out to be less a effective source of energy (lower about 10% increases and higher about 17% conversion of feed and of nutritive components). The kind of fat introduced to mixtures did not have significant influence on dressing percentage (76.1–78.1%) and musculature of chickens (38%), however it differentiated their adiposity. The highest level of abdominal fat (1.27%) in cold carcass, and also of intramuscular fat was found in chickens receiving mixtures with soya oil. The most profitable composition and participation of fatty acids in lipid fraction of meat and fatty tissue and the best taste values were found in chickens fed with mixtures with rapeseed oil.

BARTECZKO J., BOROWIEC F., MIGDAŁ W., 2001. – Efficiency of broiler chicken feeding with mixtures containing seeds of different cultivar of linseeds – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 173-182.

The experiment was carried out to determine the effect of addition of two varieties of oily linseed (Linola™947 vs. Opal) on the effectiveness of broiler chicken feeding and some blood parameters. Compared with Opal brown variety, feeding broiler chicken with mixture containing the Linola™947 linseeds was more effective. The live weight gain for broilers fed with Opal brown linseeds was about 7.5% lower but feed conversion ratio was about 5.8% higher. On the other hand, live weight gain, digestibility, dressing percentage and feed conversion ratio for broilers fed with Linola linseed mixture were similar to those observed in chicken fed with mixture containing soybean oil.

BAROWICZ T., PIESZKA M., 2001. – Hypocholesterolemic effect of full-fat seeds or oil of linseed in the diets of growing pigs – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 183-190.

Two experiments were carried out on Polish Landrace fatteners. In experiment I, 24 fattening gilts were divided into 2 groups of 12 each, and the animals from 60 to 100 kg of body weight received in complete mixtures 0% (control group) or 15% full-fat heated and ground flax seeds. In experiment II, 24 fatteners of both sexes were divided into 2 groups (6 gilts and 6 barrows each) and the animals from 70 to 100 kg of body weight received in mixtures 0% (control group) or 3% linseed oil. The experiments ended with slaughtering during which blood was sampled and *longissimus dorsi* muscle samples were taken to determine the level of total cholesterol. Blood samples were determined for total cholesterol, its fractions and triglycerides using enzymatic methods. In the blood serum of fatteners in experiment I, total cholesterol decreased from 74.7 to 67.0 mg/dl and HDL/LDL ratio increased from 2.2 to 2.6. In the *longissimus dorsi* muscle, total cholesterol dropped from 70.5 to 66.3 mg/100 g fresh tissue. In all cases, the differences were statistically non-significant. In experiment II, total cholesterol in blood serum was observed to decrease from 93.1 to 81.5 mg/dl, while HDL/LDL ratio to increase from 1.32 to 1.51. In the *longissimus dorsi* muscle, total cholesterol

decreased from 63.4 to 59.2 mg/100 g fresh tissue. In the latter case, the differences were statistically significant ( $P \leq 0.01$ ).

SZUMACHER-STRABEL M., POTKAŃSKI A., CIEŚLAK A., STANISŁAWSKI D., 2001. – Effect of rapeseed oil addition to milking sheep ration on level of conjugated linoleic acid in milk – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 509-516.

Conjugated linoleic acid (CLA) is actually under extensive research because of its potent anticarcinogenic properties and also because of its effect on the human immune system. Products received from ruminants (milk and meat) are the richest natural sources of CLA. Nutritional manipulation of diets for ruminants leads to higher level of CLA in milk. Mostly, diets containing high level of unsaturated fatty acids improve CLA production. The purpose of modifying animal fats is to produce high quality products, which meet the dietary recommendations. The influence of rape seed oil addition to diet for milking sheep (ewes) on the concentration of cis-9, trans-11 octadecadienoic acid, a conjugated linoleic acid, was investigated. The basic diet for all animals was composed of 60% concentrate and 40% meadow hay which was supplied with 0, 4, 8 and 10% of rape seed oil in dry matter. Feeding 4% rapeseed oil to dairy sheep greatly increased milk fat CLA content (by 181%), confirmed literature data. Addition of 10% of rapeseed oil to sheep ration decreased the level of CLA in comparison to control group, whereas 8% of rapeseed oil had no influence on CLA level. The obtained results were not statistically significant. The present study indicates that rapeseed oil addition to sheep rations can increase level of CLA in obtained milk.

HEŚ M., KORCZAK J., NOGALA-KAŁUCKA M., JEĐRUSEK-GOLIŃSKA A., GRAMZA A., 2001. – Accelerated methods in durability research of stabilized rapeseed oil – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 517-526.

This study was aimed at the comparison of accelerated methods in evaluation of oxidation resistance of rapeseed oil, with and without antioxidants added. Oil was stabilized by addition of BHT /butylated hydroxytoluene/ and rosemary ethanolic extract in amount of 0.02% (w/w). Durability of unstabilized and stabilized rapeseed oil was determined in the Rancimat and Oxidograph apparatus (110°C), Schaal oven test, with periodic estimation of peroxides and weight increase measurement of samples thermostated in temp. 60°C. Results obtained in the accelerated tests were compared with normal test, conducted in the ambient temperature (20°C), with periodic estimation of peroxides. The induction periods of rapeseed oil with and without addition of antioxidants were indicated. The protection factor of used antioxidants was calculated. Increased temperature and larger oxygen access in accelerated tests caused a considerable induction period abridgment of studied rapeseed oil samples. Induction period measuring values obtained in Rancimat and Oxidograph test comprised in range of 5.6–14.0 hours. In case of other methods, the estimation of peroxides was carried on for a few weeks, or even months of samples storage. Investigated antioxidants showed great activity in the applied rapeseed oil stability measurement methods. However, the protection factors of additives calculated in accelerated methods were lower than in normal test. The rosemary extract antioxidants revealed higher activity in stabilized oil than synthetic BHT. The results presented can make the rosemary extracts appropriate for preservation of rapeseed oil containing food.

PAĞOWSKI Z., 2001. – Biofuels for aviation – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 551-566.

Biofuels like alcohol (and ethers) are produced from many different plants like sugar cane, corn, potatoes, cereals and methyl or ethyl esters of fatty oils are received from plants of rape, sunflower or soya. Due to similar properties to conventional petrol fuels, confirmed by investigations in many domestic and foreign research projects and experiences convince about their use in pure form or as blends with petrol fuels. This paper presents some data about positive effects of biofuels use in all means of transport including aviation and propose introduction of national strategic biofuel program similar to programs in European countries, the USA and Canada.

KUBICKA E., JEĐRYCHOWSKI L., 2001. – Effect of phenolic compounds extracted from pumpkin seeds on native lipoxigenase activity – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 609-616.

Lipoxigenase extracts were obtained from pumpkin seeds using 10 selected extraction solutions. Extracts were characterized by varied specific activity of lipoxigenase and phenolic compounds content. Lipoxigenase was assayed spectrophotometrically at 234 nm wavelength. Relative phenolic compounds content was measured at 280 and 320 nm wavelength and expressed as the ratio  $OD_{320}/OD_{280}$ . Stability of lipoxigenase activity in crude extracts was determined after seven-day storage at temperature  $-18^{\circ}\text{C}$ . In our investigation we did not find the inhibitory effect of phenolic compounds extracted together with lipoxigenase on the enzyme activity.

POTKAŃSKI A., CIEŚLAK A., SZUMACHER-STRABEL M., STANISŁAWSKI D., 2001. – Effect of rapeseed oil addition and other energy sources on the extent of  $C_{18}$  unsaturated fatty acids hydrogenation in the rumen of sheep – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 617-622.

Ruminal biohydrogenation defined as the disappearance of linoleic and linolenic acid between the mouth and duodenum determine fatty acids content and composition in product received from ruminant animals. The extent of ruminal biohydrogenation depends mainly on the type and quantity of dietary fatty acids. The objective of the study was to determine the influence of rapeseed oil addition and other energy sources on the extent of C<sub>18</sub> unsaturated fatty acid hydrogenation in the rumen of sheep. Effect of different energy sources (6% in dry matter of diet) was estimated on four rams fitted with rumen and duodenum cannulas in 4 × 4 Latin square design consisting of four diets differing in energy source (rapeseed oil, corn starch and saccharose). There were no influence of energy source addition on the level of biohydrogenation. Statistically significant differences were observed in the level of most acids reaching the duodenum.

NIEMIEC J., STĘPIŃSKA M., ŚWIERCZEWSKA E., RIEDEL J., BORUTA A., 2001. – Effect of feeding hens with diets containing seeds of oilseed rape, of flax (linseed) and of evening primrose on laying performance, egg quality and polyunsaturated fatty acids profile in egg yolk – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 631-636.

The purpose of the experiment was to find the effect of feeding hens with diet containing rape seed, flax seed and evening primrose seed on PUFA content in egg yolk. 25 week old Messa H-43 hens flock was divided into two groups, 30 birds each. Birds of the control group were (K) fed with diet without oil crops seeds. Diet for the experimental group (RLW) contained 5% rape seed „00”, 3.66% flax seed and 2.88% evening primrose seed. Feeding hens with diet with oil crops seeds has not negative effect on laying performance, egg quality and egg smell and taste. There was found significant effect of experimental diet on fatty acid concentration in egg yolk. The PUFA content significantly increased in eggs from RLW group. In this group PUFA n-3 content in yolk increased by 58.2% and PUFA n-6 content by 12.1% in comparison to control group. To enrich eggs in PUFA, seeds of oil crops planted in our country can be used successfully.

ROTKIEWICZ D., TAŃSKA M., KONOPKA I., 2002. – Wymiary nasion rzepaku jako czynnik kształtujący ich wartość technologiczną oraz jakość oleju – *Seed size of rapeseed as a factor determining their technological value and quality of oil* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 103-112.

The purpose of this work was to examine the influence of seed size of rapeseed on their technological value and on oil quality. Seeds were separated on sieves for receiving three fractions: <1.6 mm; 1.6–2.0 and >2.0. Following parameter were analysed in seeds of every fraction: moisture, 1000 seed weight, fat content, impurities, total and phytine phosphorus, phenolic compounds, glucosinolates, composition of lipids and yield of pressing. Colour, content of carotenoids, total and non-hydratable phospholipids, composition of fatty acids, content of conjugated diene and triene acids and values characterising oil hydrolysis and oxidation: acid value (LK), peroxide value (LN) and anisidine value (LA) were estimated in extracted oils. The differences among investigated seed fractions were stated. Fractions of seeds in size 1.6–2.0 mm and above 2.0 mm had higher technological value because they contained less impurities, largest fat content and were more susceptible to pressing. Oil from large seeds was of better quality because it contained fewer non-triacylglycerol compounds, such as chlorophylls, phospholipids and products of oil hydrolysis and oxidation. Seed fraction in size below 1.6 mm was of poor value because it contained more impurities and lower fat content in composition of which more was polar lipids, chlorophylls, non-hydratable phospholipids and products of oil hydrolysis and oxidation. The research showed that fraction of seeds below 1.6 mm should be not used for production of edible oils, especially cold-pressed oils.

MIGDAŁ W., BAROWICZ T., BOROWIEC F., PIESZKA M., 2002. – Wpływ dodatku oleju słonecznikowego lub CLA w dawkach pokarmowych dla tuczników na umięśnienie i profil kwasów tłuszczowych w tkankach – *Effect of sunflower oil or conjugated linoleic acids (CLA) addition in feed rations for fatteners on meatness and fatty acid profile in tissues* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 187-200.

The researches were carried out on crossbred fatteners [♀(♀Polish Large White × ♂Polish Landrace) × ♂Pietrain], which were fed *ad libitum* from 70 kg body weight to 130 kg body weight with all-mash with participation of 2% addition of sunflower oil (I control group) and 2% addition of conjugated linoleic acid (CLA) (II experimental group). After slaughtering the leanness of fatteners was evaluated using Piglog 105 as well as the backfat thickness according to SKURTC methodology. Leanness of fatteners, which were fed with addition of conjugated linoleic acid (CLA) was higher /differences were statistically not significant/ (51.27%) than leanness of fatteners, which were fed with addition of sunflower oil (50.07%). Fatteners which received addition of CLA had statistically not significant thicker backfat than fatteners from control group. Moreover the samples of loin (*m. longissimus dorsi*), ham (*m. semimembranosus*), backfat (on the dividing line of thoracolumbar vertebrae) and liver were taken. In all samples the fatty acid profile in ether extract was estimated. Dietary conjugated linoleic acid (CLA) supports the muscle growth and reduce fat deposition. The presence of CLA in feed doses for fatteners decreased the level of unsaturated fatty acids in tissue fat. The level of polyunsaturated fatty acids was observed to decrease. This led to changes in the proportion of n-6 to n-3 PUFA.

BAROWICZ T., BRZÓSKA B., PIESZKA M., 2002. – Wpływ dodatku oleju lnianego i witaminy E do mieszanek na koncentrację selenu (Se) we krwi oraz zawartość witaminy E i skład kwasów tłuszczowych mięśnia najdłuższego u tuczników – *The effect of linseed oil and vitamin E addition to diets on selenium (Se) concentration in blood and also vitamin E level and fatty acids composition in the fatteners' longissimus dorsi muscle* – *Rośliny Oleiste - Oilseed Crops* n° XXIII (1), p. 201-206.

The experiment was carried out on 36 fatteners (Polish Landrace), divided into three groups. The fatteners from 70 kg to 105 kg of body weight were fed with the following complete mixture: group I (control) received mixtures without addition of linseed oil, group II – 3% addition of linseed oil as well as group III – 3% addition of linseed oil alongside with 300 mg of vitamin E in 1 kg of fodder dry matter. Animals were slaughtered when they attained 105 kg of body weight. In samples of longissimus dorsi muscle the composition of fatty acids (by gas chromatography) and content of vitamin E (by liquid chromatography) were determined. The concentration of selenium was marked in porkers' full blood using the method of ASA. On the base of obtained results it was stated that addition of 3% linseed oil into alimentary doses for fatteners in final period of fattening causes the increase of polyunsaturated fatty acids (PUFA) content, particularly from *n-3* family in muscle fat. Addition of 300 mg of vitamin E per 1 kg of fodder dry matter containing 3% of linseed oil decreased significantly the content of selenium in fatteners' full blood.

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## Meal

RAJ S., FANDREJEWSKI H., WEREMKO D., SKIBA G., 2001. – Influence of digestible lysine content in the cereal-rapeseed mixtures on growth ratio and chemical composition of daily body gain of pigs – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 147-152.

Thirty-five gilts from 25 to 70 kg divided into five groups were fed on diets containing barley, wheat or maize and rapeseed meal and mineral mixtures. The diets had similar metabolizable energy concentration ( $12.50 \pm 0.03$  MJ EM) and different digestible lysine content (6.0 to 8.2 g/kg). Chemical composition of body gain and protein and fat deposition from 25 to 70 kg body weight were determined by the comparative slaughter method. Daily feed intake (average  $2.31 \pm 0.02$  kg), daily gain ( $867 \pm 23$  g) and feed conversion rate ( $2.67 \pm 0.06$  kg/kg) were not statistically affected by dietary digestible lysine content. Daily protein deposition in the body increased from 127 to 141 g as digestible lysine rose from 6.0 to 7.6 g/kg ( $P < 0.05$ ), and next decreased about 10% ( $P < 0.05$ ) when lysine in the diet increased from 7.6 to 8.2 g/kg. No statistical differences were observed in daily fat deposition, which on average amounted  $184 \pm 6.37$  g. Daily protein deposition related to digestible lysine intake (g/g) was the best (6.71 g/g) in pigs fed diet containing 6.0 g/kg digestible lysine and the worst (8.94 g/g) in pigs fed diet containing 8.2 g/kg digestible lysine ( $P > 0.05$ ). Lack of statistical differences in the performance of pigs indicates that the chemical composition of daily body gain (gain of protein) is a better characteristic of nutritive value (digestible lysine content) of the cereal-rapeseed mixtures than growth ratio of growing pigs.

VAN CAM NGUYEN, SMULIKOWSKA S., MIECZKOWSKA A., 2001 – *Effect of antinutritional factors of flax seeds on performance of broiler chicken* – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 165-172.

Ninety nine female broiler chickens at the age of 8 days were randomly allocated to 4 groups. Birds were fed with isoprotein and isoenergetic diets: K (control), F (80 g/kg flax seed), FP (as F supplemented additionally with 4 mg/kg pyridoxine) or FO (as K, but part of the lard was substituted by flax oil). Birds were weighed and feed intake measured in weekly intervals. After the end of the experiment 10 birds from groups K, FP and FO were killed and viscosity and pH were measured in ileal digesta. In group F body weight gain and feed conversion ratio were respectively 2% and 5% lower than in group K. After increasing the pyridoxine content in diet respective parameters in group FP were comparable with group K. Viscosity of ileal digesta in group FP was higher ( $P < 0.05$ ) than in groups K and FO (4.52 vs. 1.59 and 1.54 cP respectively) and pH non significantly lower. In group FO feed conversion ratio was better ( $P < 0.05$ ) by 5% than in groups K and FP and by 10% ( $P < 0.05$ ) than in group F.

MIGDAŁ W., BOROWIEC F., PYŚ J.B., KOCZANOWSKI J., BARTECZKO J., FURGAŁ K., 2001. – Effect of content the full-fat soyabean meal, rapeseed meal and peanuts meal in complete mixtures for fatteners on fatty acids profile fat and cholesterol level in ham and loin – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 191-206.

The studies were carried out on fatteners, which were fed on the complete mixtures with the participation of full-fat soyabean meal or full-fat rapeseed meal, full-fat rapeseed meal or waste peanut meal and with the participation of standardized fats. Meals of: soyabean, rapeseed and waste peanut constituted 10% of mixture weight. Using meal made of full seeds from oil plants influenced the increase of the content of polyunsaturated fatty acids (linoleic and linolenic) in loin and ham fat. After adding waste peanut meal non-

significant increase of linoleic acid and decrease of linolenic acid in loin and ham fat were observed. Ether extract of peanuts contained 21.7% of linoleic acid and 0.1% of linolenic acid. The results of studies show that the relation between polyunsaturated fatty acids (PUFA n-6 to n-3) has higher influence on the reduction of cholesterol level in fat of fatteners than the total content of unsaturated fatty acids in plant oil. At the same time there was observed deterioration of carcass' technological quality: soft, gooey backfat of fatteners, which received full fat soyabean and rapeseeds. According to previous researches - the optimal composition of fatty acids is: stearic acid not less than 12%, linoleic and linolenic acids is not higher than 15% of total number of fatty acids.

BOROWIEC F., ZAJĄC T., MIGDAŁ W., MICEK P., 2001. – Effect of diet with linseed on nutrient digestibility and some indices in rumen content and in blood plasma of sheep – *Rośliny Oleiste - Oilseed Crops* n° XXII (1), p. 207-216.

The aim of nutritional and physiological study was to evaluate the effect of 10% addition of oily linseed (Opal species) to concentrate mixtures on digestibility, N balance, live weight gain, rumen pH, N-ammonia and volatile fatty acid (VFA) concentrations in the rumen fluid as well as on blood plasma parameters of lambs: total lipids, triglicerydes, total cholesterol, low density lipoproteins (LDL) and high density lipoproteins (HDL). The experiment was carried out on 4-month Polish Long-haired rams weighing approximately 27 kg. The addition of pressed oily linseed had no essential influence on nutrients digestibility, N balance, live weight gains and feed conversion. The addition of the oily linseed to the diet did not have a significant effect on fermentation in the rumen, except for a tendency for a lower VFA concentration in the rumen fluid samples taken before feeding and at 1.5 h after feeding. Linseed supplementation significantly increased the plasma blood concentrations of total lipids, triglicerydes, total cholesterol, HDL and LDL.

JĄSKIEWICZ T., 2001. – Applicability of extruded faba bean-rapeseed concentrate as a substitute of soybean meal for broiler chickens diets – *Rośliny Oleiste - Oilseed Crops* n° XXII (2), p. 495-508.

Feeding efficiency of proteine-energy concentrate prepared from extruded, dehulled faba bean and whole rape seeds in broiler chickens diets was investigated. Digestibility test and two growth experiments were conducted. Additionally, in the latter experiment, nutrients and fatty acids digestibility in mixed feeds was measured by means of balance method. It was demonstrated that the country protein material, i.e. dehulled and extruded seeds of faba bean and full-fat double low oilseed rape can reduce the use of imported soybean meal by 50%, while replacing energy supplement of soybean meal with fats, at comparable or more beneficial performance of broiler chicken. High nutrient value of the concentrate was due to the high digestibility of fatty fraction and protein in comparison with the raw seeds.