

# Bibliography sent

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#### Agronomy

Kotecki A., Kozak M., Malarz W., 2002 The use of winter wheat straw for winter oilseed rape fertilization

I. The influence of wheat straw and N rates on the development and yielding of winter rape *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 287-302.

In the years 1998–2001 field and laboratory study on the effects of growing rates of wheat straw and N on the development and yields of winter rape (Silva cultivar) were carried out at the experiment station in Pawłowice. The experiment in the split-plot arrangement was conducted with 2 variables: I – winter wheat straw (Kobra cultivar) – a) control without straw; b) straw ploughed under, II – N at 0, 25, 50 and 75 kg/ha. The weight of harvest residues of roots and stubble of winter wheat in the soil was recorded at 26% and accumulation of macroelements ranged from 21 to 29% of total weight (roots + stubble + straw) that amounted to 7,6 t/ha, on average, and accumulated: N – 37.8, P – 6.6, K – 47.5, Ca – 14.2 and Mg – 9.8. Winter rape cultivated after winter wheat with straw ploughed under showed slower development in autumn as compared to the site without straw. The plants had less leaves before the winter and dry matter of a plant was 30% lower, but the number of siliques and seed yields were 4% and 7% higher, respectively. The site with straw needed 50 kg of N/ha in autumn, as compared to the control, and as a result, the number of siliques increased by 8% and the number of seeds in the siliques by 4% which consequently increased the seed yield by 13%.

II. The influence of wheat straw and N rates on chemical composition of winter rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 303-312.

In the years 1998–2001 field and laboratory study on the effects of growing rates of wheat straw and N fertiliser on chemical composition of winter rape (Silva cultivar) were carried out at the experiment station in Pawłowice. The experiment in the split-plot arrangement was conducted with 2 variables: I – winter wheat straw (Kobra cultivar) a) control without straw; b) straw ploughed under, II – N at 0, 25, 50 and 75 kg/ha. The contents of total protein and oleic, linoleic, linolenic, palmitic, arachic and behenic acids were influenced by temperature and moisture conditions and also depended on agrotechnical factors, but to a slight extent. 50 kg of N/ha before sowing, as compared to the control, decreased fat content by 1.2%. The highest yields of crude fat and total protein were obtained without straw, at 75 kg N/ha and 25–50 kg N/ha with straw. Straw fertilization, as compared to the control, increased crude fat by 7% and total protein by 8%. A reverse relationship was found in oleic, linoleic and linolenic acid contents. The increase of linoleic and linolenic acids occurred in the years unfavorable to oleic acid accumulation.

III. The influence of wheat straw and calcium rates on the development and yielding of winter rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 313-326.

In the years 1998–2001 field and laboratory study on the effects of growing rates of wheat straw and N fertiliser on the development and yields of winter rape (Silva cultivar) were carried out at the experiment station in Pawłowice. The experiment in the split-plot arrangement was conducted with 2 variables, I – winter wheat straw (Kobra cultivar) a) control without straw; b) straw ploughed under, II – calcium at 0, 0.5, 1.0, 1.5 tonnes/ha. The weight of harvest residues of roots and stubble of winter wheat was recorded at 23% and the accumulation of macroelements ranged from 21 to 29% of total

weight (roots + stubble + straw) that amounted to 7.6 t/ha on average and accumulated to: 40.5 N, 6.0 P, 53.4 K, 15.8 Ca and 8.3 kg/ha Mg. The winter rape cultivated after winter wheat ploughed under as compared to that without straw showed weaker development of plants in autumn. The plants had less leaves before the winter and dry matter of a plant was 22% lower, but the number of siliques and seed yields were 18% and 3% higher, respectively. Straw fertilization + 1.5 tonnes of Ca/ha as compared to the control increased the growth of siliques on plants by 20%, the number of seed in a silique by 7% and the seed yield by 12%.

#### IV. The influence of wheat straw and Ca rates on chemical composition of winter rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 327-336.

In the years 1998-2001 field and laboratory study on the effects of growing rates of wheat straw and Ca fertiliser on chemical composition of winter rape (Silva cultivar) were carried out at the experiment station in Pawłowice. The experiment in the split-plot arrangement was conducted with 2 variables: I – winter wheat straw (Kobra cultivar) a) control without straw; b) – straw ploughed under, II – Ca at 0, 0.5, 1.0, 1.5 tonnes/ha. The contents of total protein and oleic, linoleic, linolenic, palmitic and arachic acids were influenced by temperature and moisture conditions and also depended on agrotechnical factors, to a slight extent. The content of crude fat was decreasing, while the content of total protein was increasing under the influence of Ca fertilization on the site with straw ploughed under. The higher yields of crude fat and total protein were obtained at 1.5 tonnes of Ca/ha. Straw fertilization as compared to the control increased the yield of crude fat by 3.3% and total protein by 4.7%. A reverse relationship was found in oleic, linoleic and linolenic acid contents. The increase of linoleic and linolenic acids occurred in the years unfavorable to oleic acid accumulation.

#### Szymczak-Nowak J., Nowakowski M., 2002 – Yielding and influence of white mustard, oil radish and tansy phacelia cultivated as a main crop on beet cyst-nematode population – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 223-234.

In 1999–2001 field trials in Bydgoszcz on light loamy sand were carried out to assess the yield and antinematode effect of some varieties of white mustard (Arwis, Barka, Metex, Nakielska), tansy phacelia (Mira, Natra, Stala) and oil radish (Colonel, Remonta, Resal) cultivated as a main crop. Varieties of white mustard, oil radish and tansy phacelia differed significantly as to plant height and yield of shoots. Within white mustard varieties, the Barka variety with tallest stalks produced the highest yield of shoots, roots and seeds. Remonta variety, among oil radish varieties, had significantly higher mass of stalks. Stala produced the lowest yield of fresh mass and roots and was shortest of all tested tansy phacelia varieties. Shoot yields of white mustard, oil radish and tansy phacelia were highest in 2000 and lowest in 1999. Oil radish varieties — Colonel, Remonta and Resal reduced the amount of larvae and eggs of beet cyst-nematode (*Heterodera schachtii* Schmitd) to the highest degree — 55.1%, 47.3% and 40.8%, respectively. Among white mustard varieties Metex and Barka were most effective in reducing the population of beet cyst-nematode, 35.4% and 27.7%, respectively. The cultivation of white mustard Nakielska caused the highest increase of nematode population. Among tansy phacelias, which also significantly reduced the population of beet cyst-nematode, were no differences between varieties in anti-nematode effect.

#### Wójtowicz M., Wielebski F., Czernik-Kołodziej K., 2002 – Effect of spring nitrogen fertilization on agronomical and commercial plant characters of new breeding forms of winter oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 337-350.

#### Wójtowicz M., Wielebski F., 2002 – Variability of cultivated area, yields, and production of oilseed rape in Poland in the period of 1998–2001 – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 581-590.

In the paper cultivated area, yield, and production of oilseed rape in Poland in the period of 1998–2001 was estimated. Calculation was made on the ground of the data published by the Central Statistical Office (GUS). The highest cultivated area and production of oilseed rape was recorded in 1999. In this year cultivated area amounted to 545.3 thousand ha and production to 1131.9 thousand tons. In the analysed period, the highest cultivated area of oilseed rape was in zachodniopomorskie province and the

highest production in dolnośląskie province. Share of eight provinces with the highest oilseed rape concentration in total cultivation area ranged from 87.7% in 1998 to 89.3% in 2001. Provinces significantly differed in yield level of oilseed rape. The highest yield was recorded in opolskie province. Yield variation in the analysed period ranged from 2.2% in Śląsk province to 24% in podlaskie province.

Zajac T., Klima K., Borowiec F., Witkowicz R., Barteczko J., 2002 – Yielding of linseed varieties in various site conditions – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 275-286.

The amount of linseed seed yield, its components and oil content were compared for 5 lined cultivars: Opal, AC Linora, Flanders, Barbara and Hungarian Gold. It was demonstrated that yielding of linseed cultivars of different origin was similar and depended mainly on the effect of random factors, such as years, locations and the interaction between them. An analysis of the size of linseed seed yield components revealed that the cultivar origin affected the number of shoots. Canadian varieties developed higher number of shoots in comparison to Hungarian ones. The sites where the plants were cultivated only slightly diversified their oil content and fatty acids composition in the oil from the linseed cultivars. In less favourable site conditions in the mountainous areas linseed seems the only oil plant worth recommending for cultivation as a commercial crop.

## Breeding

Adamska E., Cegielska-Taras T., Szała L., 2002 – The genetic parameters for determining traits of yield elements and the oil contents in oilseed rape estimated on the basis of DH lines obtained from F<sub>1</sub> hybrid (DH O-120 × DH C-1041) – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 215-222.

Doubled haploid lines on the basis of their completely homozygosity constitute suitable material for the genetic study of quantitative traits. The results of three year experiments carried out at two places are shown. 32 DH lines obtained by the culture of isolated microspores from plants of winter oilseed rape of F<sub>1</sub> generation hybrid (DH O-120 × DH C-1041), hybrids generation F<sub>1</sub>, F<sub>2</sub> generation (in the first year of experiment) and hybrids of F<sub>2</sub> and F<sub>3</sub> generation (in the second and third year of experiments) and their parental forms were studied. The length of siliqua, number seeds per siliqua, 1000 seeds weight and content of oil were estimated. Genetic parameters describing additive effects of genes [d], domination [h], and non allelic interaction of homozygous loci [i] and heterozygous [I] were calculated. Effects of additive genes action were significant for each studied traits. The dominance was significant only for the length of siliqua and the number of seed per siliqua (in the direction of growing value of the trait). The effect of heterozygous genes action did not appear in the study

Ochodzki P., Piotrowska A., 2002 – Physical properties and chemical composition of winter rapeseeds with different colour of seed coat — *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 235-242.

Physical properties and chemical composition of whole seeds and separated seed coat and cotyledons of conventional variety Kana and Lisek and 3 breeding lines of yellow-seeded double improved winter type *B. napus* L. were determined. Partially and completely yellow seeds (1 – brown, 3 – yellow-brown and 5 – yellow) were smaller than black seeds (3.55, 4.77, 3.67 and 5.33 g/1000 seeds, respectively). Resistance of seeds to mechanical destruction was highly related to the colour of the seed-coat. Energy required for crushing black seed coat was higher compared to yellow seed of the same diameter (380, 175, 114 and 66 J, for Lisek, 1, 3 and 5, respectively) . A trend: lighter seed coat – lower breaking-energy was observed. Content of oil extracted by SFE was higher in yellow seeds compared to black seeds (from 34.2% to 43.1% respectively), and protein content in defatted yellow seeds was also higher (from 36.6% to 46.15%, respectively). Insoluble dietary fiber (IDF) in seed decreased (27.5%, 25.7% and 24.7%, in samples 1, 3 and 5 respectively). High variability of oil, protein and fiber content, as well as of the seed size shows perspectives of further modification of chemical composition of rapeseeds.

Szała L., Krótka K., Czernik-Kołodziej K., Cegielska-Taras T., 2002 – The characteristic of doubled haploids obtained from cultivar Bor of winter oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 243-254.

Hundred doubled haploid lines in DH<sub>1</sub> generation were obtained by isolated microspore culture from donor cultivar Bor. These lines were grown in systematically plotted field experiment in one replication during season 1999/2000. Observations of the beginning of flowering, plants height, silique length and seed number per silique were done during experiment. Also 1000 seed weight, fatty acids composition and glucosinolate content were estimated in harvested seeds. The hundred doubled haploid line were differentiated significantly according to the studied traits besides plants height and beginning of flowering. 18 genotypes with much desired traits were chosen from examined DH population. These DH lines were studied in replicated experiment in the 2000/2001 season. The seed yield of 8 DH lines was at the level of donor cultivar but 10 DH lines yielded significantly lower than cultivar Bor. Line DH B-21 was the best with the seed yield equal to 102,6% (48,1 dt ha<sup>-1</sup>) of the donor cultivar Bor.

Spasibionek S., 2002 – The importance of mutagenesis in the development of new genotypes of oilseed crops with changed fatty acid composition – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 533-546.

Vegetable oils, especially C<sub>18</sub> fatty acids, which occur in them have essential importance for human nourishment and also they can be used for different technical purposes. Therefore oils with different fatty acid composition are needed. Induced mutagenesis plays significant part in the development of new fatty acid variability in oilseed crops. This paper considers the possibilities of utilization of vegetable oils with desirable oil profile as well as the present results of mutagenesis breeding of oilseed plants, such as: rapeseed, soybean, sunflower, linseed.

Nowakowska J., 2002 – Mutagenesis and its application in the oilseed crops research – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 547-560.

A survey work which introduces a general characteristic of mutations and mutagenesis as well as the use of induced mutations in research on oilseed rape and other oilseed crops (mustards, *Camelina sativa*, flax, soybean). The mutations occur in the form of point, chromosomal and genomic mutations. The spontaneous mutations are the source of genetic variability of organisms, yet they appear with small frequency. Therefore the induction of mutations with the help of physical and chemical agents is a valuable tool in plant breeding, because it increases genetic variability of features and it permits to carry out the selection of genotypes with features favourable for breeding aims. The most frequently applied physical mutagens are ionizing and ultraviolet radiation. The ionizing radiation causes the appearance of chlorophyll mutants in winter oilseed rape, which could be useful as genetic markers in oilseed rape breeding. However, this mutagen causes changes in fatty acid composition in seeds of *Camelina sativa* and *Brassica juncea*. In the case of chemically induced mutations the most widespread are the alkylation agents. Belonging to this group of mutagens, EMS (ethyl methanesulphonate) is applied to increase the variability of proportions of individual fatty acids in the oil of winter oilseed rape, Ethiopian mustard and flax. Joined treatment with physical and chemical mutagens is also applied in plant breeding. This method enables the increase of variability of features comparing with the treatment with only one type of mutagen.

## Weed Control

Franek M., Rola H., 2002 – efficacy of herbicide nimbus 283 se to weed control in winter oilseed rape on lower silesia – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 351-356.

In order to obtain high yield of winter rapeseed the herbicides applied to the field need to be carefully chosen according to the condition and degree of weed infestation. It is preferable to use for weed control herbicides containing two active substances. In the Department of Ecology & Weed Control the experiments aiming at the evaluation of Nimbus 283 SE herbicide were carried out. Nimbus, 283 SE containing 250 g/l metazachlor and 33.3 g/l clomazone, was applied just after sowing of rape in the

rates of 2.5 and 3 l/ha. The experiments were established by randomised block design, on trials in three replications (plot area 25 sq. m.). Soil and plant cultivation was done in accordance with phytotechnic principles for winter oilseed rape. Nimbus 282 SE, applied direct after sowing of winter oilseed rape, eliminated: *Apera spica venti*, *Galium aparine*, *Anthemis arvensis*, *Tripleurospermum inodorum*, *Descurainia sophia*, *Stellaria media*, *Thlaspi arvense*, *Capsella bursa-pastoris*, *Lamium amplexicaule*, *Lamium purpureum*, *Veronica persica*. The phytotoxic effects of herbicide Nimbus 283 SE on winter oilseed rape of Lirajet and Silvia varieties were not observed. The yield harvested from the herbicide objects was higher about 27 to 54% in comparison with the yield obtained from the control object.

Franek M., Rola H., 2002 – effect of weed control by galera 334 sL herbicide in winter oilseed rape — *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 357-364.

Community of weeds in winter oilseed rape are most diversified, but dominant species are *Galium aparine* (on heavy soils) and *Anthemis arvensis* (on light soils). During 2000-2001, experiments on evaluation of herbicide Galera 334 SL efficacy to weed control in winter rape were carried out in Department of Ecology and Weed Control. Galera 334 SL contain clopyralid 267 g/l (eliminating well *Anthemideae* species) and picloram 67 g/l (eliminating well *Galium aparine*). The experiments were established in randomised block design, in trials with three replications (plot area 25 sq. m.). Soil and plant cultivation was done in accordance with phytotechnic principles for winter oilseed rape. Herbicide was applied in dose 0.3 and 0.35 l/ha autumn, after emergence of rape (T-3) and spring, after the beginning of plant vegetation (T-5). Galera 334 SL, applied in autumn and spring, well eliminated *Galium aparine* and *Anthemideae* species. Other weed species (*Apera spica venti*, *Veronica persica*, *Stellaria media*, *Viola arvensis* and *Hordeum vulgare*) were weakly controlled or not controlled at all. Mixtures Galera 334 SL + Starane 250 EC require continuation of researches.

Franek M., Rola H., 2002 – Application of herbicides to weed control in winter oilseed rape in dependence on economic condition of farm – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 365-372.

To achieve profitable oilseed rape yield chemical control of weeds is a necessity. To reduce weed control costs, most of farmers are using the cheapest herbicides, for many years — most frequently mixture of Command 480 EC + Lasso 480 EC. This mixture controls effectively *Stellaria media*, *Galium aparinae* and *Lamium purpureum* but other weed species are medium susceptible or even resistant like *Descurainia sophia* — a species of growing economic importance. If such weeds are not controlled the harvested yield will be lower than expected and possible to achieve. The cheapest herbicide applied in oilseed rape for many years is trifluralin (eg. product Triflurotox 250 EC) but the cost of application is raised by obligatory incorporation into the soil. Trifluralin should not be used on fields infested with *Anthemidae*, or when these weeds appear additional treatment should be introduced in relevant systems. Such systems were developed in the Department of Ecology and Weed Control IUNG in Wrocław based on trials carried out in years 1985–2001 (tab. 4). These treatments are necessary when both grass weeds (eg. voluntary cereals) and broadleaf weeds must be controlled. On intensive farms, achieving high yields, more profitable is use of more expensive herbicides, but with wide spectrum of controlled weeds. This is of special importance on fields which were set-aside, where high number of weed seeds are existing in the soil. Higher investment in weed control is then compensated by higher yields.

Badowski M., Rola H. 2002 – Efficacy of *Elymus repens* control in winter oilseed rape by graminicides: Focus Ultra 100 EC, Fusilade Forte 150 EC, Fusilade Super 125 EC and Targa Super 05 EC – *Rośliny Oleiste - Oilseed Crops* n°XXIII (2), p. 373-376.

*Elymus repens* occurs very often on winter rapeseed plantations. The species is resistant to mechanical control and therefore it is controlled chemically with graminicides. In 1998–2000 in the Department of Ecology and Weed Control, field experiments were carried out with the following graminicides: Focus Ultra 100 EC, Fusilade Forte 150 EC, Fusilade Super 125 EC and Targa Super 05 EC. The experiments were established in randomised block design. Trials were made with 3 replications (plot area 25 sq. m.). Soil and plant cultivation was done in accordance with phytotechnic principles for winter oilseed rape. Graminicides were applied in autumn, after rape germination, when *Elymus repens* was in growth stage

of 4–6 leaves. Control of *Elymus repens* by Fusillade Forte 150 EC, Fusilade Super 125 EC (dose 3 l/ha) and Targa Super 05 EC (dose 2.5 l/ha) was very effective (99–100% of weed control). A little weaker effect in *Elymus repens* control was observed after application of Focus Ultra 100 EC, dose 3 l/ha (90% of weed control). The phytotoxic effects of used herbicides on winter oilseed rape were not observed. The yield obtained from the herbicide treated objects was higher in comparison with the yield obtained from the check plot.

## Insects

Kaczmarzyk M., Klukowski Z., Kelm M., 2002 – Migration activity of marked pollen beetles (*Meligethes aeneus* F.) on winter rapeseed crop – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 377-384.

Experiments on the rate and directions of pollen beetles spreading mechanism in oilseed rape crop were conducted in 2001 using capture-mark-recapture (CMR) techniques. On the experimental field, staked out from the winter rape plantation (ca 4 ha), we performed our experiment twice – at the yellow bud stage and at full flowering stage. Marked with fluorescent dust adult pollen beetles were released on the edge of experimental field and multiple recaptured during 12–13 days to small yellow dishes (I experiment) and yellow sticky traps (II experiment). From total number of 8382 marked and released beetles in both experiments we obtained frequency of those recaptured at 3.3% level. Migration of marked pollen beetles into the crop in both plant vegetation stages was only 30 m deep, only two directions of migration were observed, identical to areas of bigger concentration of unmarked pollen beetles. Statistical analysis proved, that the vehemence of the wind influences migration directions. Pest activity is dependent on total insolation (and on resulting from it maximum daily temperature) during last four days; rainfalls completely limit this activity. We find that intensity of migration of overwintering pollen beetle population during yellow bud stage and full flowering stage is low. Further study of pollen beetles behaviour will give a possibility to develop Integrated Pest Management for winter rape and to reduce insecticide use on this crop.

## Diseases

Starzycka E., Kachlicki P., Starzycki M., 2002 – Diversity of Polish and Chinese isolates of *Sclerotinia sclerotiorum* (Lib.) de Bary and their ability to oxalic acid production – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 385-390.

Stem rot caused by *Sclerotinia sclerotiorum* (Lib.) de Bary fungus is one of the most serious diseases of many crops, including oilseed rape. Since the pathogen causes major decrease of seed yield it is important to study the aggressiveness of its isolates which corresponds to their ability to produce oxalic acid. In this study we have used high performance liquid chromatography (HPLC) to study the production of this compound by *S. sclerotiorum* strains of different origin. There were 0.44 mM to 3.18 mM concentrations of oxalic acid detected in the culture filtrates of the tested isolates after 3 weeks of the fungus growth.

Sadowski CZ., Batur A., Lenc I., Trzciniński J. 2002 – Downy mildew (*P. parasitica*) and powdery mildew (*E. cruciferarum*) occurrence on spring oilseed rape cv. Star depending on differentiated fertilisation with nitrogen and sulphur – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 391-408.

The subject of research conducted in 1997–1999 was evaluation of downy mildew (*P. parasitica*) and powdery mildew (*E. cruciferarum*) occurrence on spring oilseed rape (cv. Star) depending on differentiated fertilisation with nitrogen (60, 120, 180 kg ha<sup>-1</sup>) and sulphur (20 and 60 kg ha<sup>-1</sup> in elementary and ionic form applied on leaves or into soil). Downy mildew was observed every year in high intensity. Symptoms were less numerous on the plots fertilised with sulphur. Higher doses of nitrogen resulted in higher incidence of this pathogen. Powdery mildew was noted in high intensity only in 1998, much lower in 1999 and in 1997 its symptoms were only in traces. The influence of sulphur

fertilisation on powdery mildew occurrence was not observed, however significantly higher number of symptoms were noted after fertilisation with nitrogen applied in higher doses.

Mączyńska a., Krzyżińska b., Pietryga j., 2002 – Effectiveness of control of fungal diseases on winter rape pods during early and late infection – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 409-416.

Fungal diseases infect winter rape through the whole vegetation season. Fungal pathogens attack all its organs, also pods. Treatment date against pods diseases is ranges: from the beginning of flowering to the phase of first pods. Field studies were carried out in 1999/2000 and 2000/2001 vegetation seasons to estimate the effectiveness of some fungicides used at the beginning of flowering with early but not strong infection and with late but strong infection. Field experiments were conducted in the Institute of Plant Protection, Branch Sońnicowice. Disease assessments (grey mould and dark leaf spot) were made by sampling of 25 oilseed rape plants per plot and estimating the percent of coverage with disease on pods four, five (only in 2001), six and eight weeks after application. Yields were estimated for all plots and expressed in t/ha at 9% moisture content. Results were analysed statistically using a Student t test. When winter rape pods were early affected by fungal diseases (2000 year), all fungicides, which were used in experiments, limited statistically significantly the spread of *Alternaria* spp. and *Botrytis cinerea* on pods and increased significantly the yield, about 18–24% as compared with untreated sample. Results of experiments conducted in 2001 year suggest that during very late and strong pods infection fungicides application at the beginning of flowering sometimes cannot give significant control of disease on pods. Only some fungicides gave significant control of pod diseases, resulting in yield increases. Fungicides containing carbendazime + flusilazole and iprodione weakly protected pods of winter rape against fungal diseases and did not give significant yield increase. Metconazole and tebuconazole increased yield and hundred seeds weight and gave good disease control on pods of winter rape.

## Molecular markers

Matuszczak M., 2002 – The use of AFLP method for analysis of winter oilseed rape DNA – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 255-266.

The AFLP method was used to obtain molecular markers in winter oilseed rape. The method carries the advantages of both RFLP and PCR technics. It is a good substitute for other methods, because of its proved reliability and replicability. In Oil Crop Department of IHAR (Plant Breeding and Acclimatization Institute) in Poznań the protocol for non-radioactive detection of DNA fragments was established. It was done using Gibco BRL kit for AFLP reactions and followed by polyacrylamide gel electrophoresis together with silver staining, to obtain patterns of polymorphic DNA fragments. The mapping population of doubled haploid lines of winter oilseed rape was studied here. These plants were analyzed using AFLP method and 70 polymorphic fragments were found. Because of its advantages the AFLP method will replace or at least complement other methods for obtaining molecular markers.

## Analysis

Koprna R., Kolovrat O., Nerušil P., 2002 – Comparison of accuracy of screening methods for determination of glucosinolate content in winter rape seed – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 267-274.

In 2001 a round robin test of screening for glucosinolate (GSL) contents in 30 samples of winter rape was carried out at several institutes in the Czech Republic and in Germany. In the year 2002 this test was complemented with the determination of GSL content by using the paladium test. The screening method NIRS (Near Infrared Spectroscopy), the glucotest and the paladium test were compared with the reference method HPLC (High Pressure Liquid Chromatography). The highest correlation coefficient was found between HPLC and NIRS ( $r = 0.7578^{**}$  and  $r = 0.7804^{**}$ ), whereas the lowest correlation coefficient was observed between HPLC and the glucotest ( $r = 0.6346^{**}$ ) and between HPLC and the paladium test ( $r = 0.6280^{**}$ ). The results suggest a potential of using NIRS for a wide range of GSL contents, whereas the glucotest and the paladium test only help eliminate genotypes with GSL content above the limit.

Walisiewicz-Niedbalska w., Lipkowski a.w., Gwardiak h., Różycki k., Patkowska-Sokoła b., Opolski a., Muzalewska m., 2002 – Poppy seed oil derivatives as biological active substances – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 439-446.

Fatty acids composition of poppy seed oil was investigated. Oil was obtained from seeds of low morphine (Michańko, Agat, Mieszko, Zambo, Rubin and Przemko) and high morphine (Lazur) poppy varieties. Michańko was chosen for further investigation because of high linoleic acid content (72.8%), low oleic acid (12.6%) and linolenic acid (0.8%) content. Saturated acids, mainly the palmitic acid (11.3%), can be removed in a separate process. The process of alkalic isomerization of poppy seed oil to CLA isomers, mainly C<sub>18:2</sub>9c,11t and 10t,12c, was investigated at temperatures: 140, 160 and 180°C. Satisfactory level of linoleic acid transformation into CLA was achieved at 180°C with a simultaneous formation of undesired C<sub>18:2</sub> isomers. Presence of free fatty acids in poppy seed oil resulted in reduced formation of 10t,12c isomer or made easier its degradation to undefined linoleic acid isomers. Thermal stability described in very drastic conditions showed that 9c,11t is more stable than 10t,12c isomer. Summing up, poppy seed oil seems to be an excellent substrate for obtaining biologically active CLA isomers.

Nogala-Kałucka m., Gogolewski m., Jaworek m., Siger a., Szulczewska a., 2002 – Determination of some components as indicators of the quality of rapeseed produced in different regions in Poland – *Rośliny Oleiste - Oilseed Crops* n°XXIII (2), p. 447-460.

Winter rapeseeds are the main national oil source. Technological utility of the produced seeds depends on the presence of such components as dry mass, fat and protein content. Nutritional value of the oil obtained from these seeds is affected by the polyunsaturated fatty acids content, especially the classified as essential unsaturated fatty acids (EUFA) and vitamin E content. Oils with the increased EUFA content, in the appropriate proportion to vitamin E, are recommended by dieticians and medical doctors due to their defined biological activity. In the study double low rapeseeds coming from five different regions of Poland as well as chosen varieties of rapeseeds harvested in the years 2000 and 2001, in the region of Wielkopolska were investigated. The NIR spectrometry was applied permitting determination of water, fat and protein contents in the samples. The fatty acids composition was determined by the GC with FID (240° C) and helium being the mobile phase (0.57 ml/min). The results obtained were subjected to statistical analysis. In the samples of rapeseeds average content of water was between 7 and 8.5% while the protein content in samples coming from different regions was about 20% dry matter. Differences were not observed in fat content of rapeseeds – it amounted to 42% dry mass. In all samples percentage of oleic acid was the highest and it ranged from 61.6% for varieties produced in Śląsko-Opolski region up to 63% noticed in samples from Wielkopolska region. The sum of linoleic and linolenic acids was the highest (27.4%) in samples from Kujawsko-Pomorski region while the lowest was observed in Śląsko-Opolski region (25.8%). The level of the erucic acid conformed to the requirements for the double low varieties, except for seeds harvested in the Śląsko-Opolski region in which the content of this acid exceeded the acceptable level of 2%.

Markiewicz k., Zadernowski r., Markiewicz e., Czaplicki S., 2002 – Mineral composition of bio-oils pressed from seeds of evening primrose and borage – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 461-470.

In Poland pharmaceutical bio-oils are produced in the process of pressing seeds of evening primrose or borage on a hydraulic press or expeller. Friction forces that appear during pressing may decide not only about the chemical composition of oils, but also about their keeping quality. The aim of the studies was to determine the effect of the methods of seed pressing and extraction on the mineral composition of evening primrose and borage oils. The experiment included the determination of the content of micro- and macroelements in the soil used for evening primrose and borage growing, in their seeds and in oils obtained as a result of pressing on a hydraulic press or expeller, and cold hexane extraction. The mineral composition of hydrated oils was also determined. The results show that the methods of oil production and hydration have a significant effect on its mineral composition. The mineral composition of soil has essential influence on the minerals content of seeds, in particular heavy metals. Mineral elements concentration was significantly higher in oils extracted from borage than from evening primrose. Both the oils obtained by hydraulic press or expeller have comparable minerals content.

Extracted oils however, especially from borage had higher Ca, Mg and P content and lower Zn and Fe content. Moreover borage extracted oil had higher level of Cd and Pb. The hydration process caused significant reduction of minerals content in oil.

Rotkiewicz D., Konopka I., Tańska M., 2002 – Carotenoids and chlorophylls in plant oils and their functions – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 561-580.

The paper is a monograph of carotenoids and chlorophylls, which as plant oils dyes, through the influence on oxidation, determine their stability. The content of dyes in seeds and oils, quantitative and qualitative changes in industrial processes and their technological functions are presented. Influence of dyes on photo- and autoxidation of oils is described in detail, showing on chlorophylls prooxidation activity and on conditioned by different factors, pro- and antioxidation activity of carotenoids in different models. The discussion of chlorophylls influence on hydrogenation process and nutritional function of carotenoids finishes the work.

## Technology

Tys j., Sobczuk h., Rybacki r., 2002 – Influence of drying temperature on mechanical properties of seeds of oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 417-426.

The objective of the investigation was to estimate the influence of different drying temperatures on mechanical properties of rapeseed. The results pointed to negative influence of this factor on mechanical properties determined with both static and dynamic tests. Increase of the drying temperature above 100°C caused remarkable decrease of seed strength measured with dynamical test. Investigations of seeds from different varieties of oilseed rape showed differences between their mechanical properties independently of the drying temperature. The most resistant to the dynamical stress were seeds of Bristol variety. The least resistant were seeds of Marita and Kana varieties. Seeds of spring varieties are relatively weaker than seeds of winter varieties. Different initial moisture content in seeds of oilseed rape before drying (here 6, 9, 13 and 17% was applied) influenced also mechanical properties of dried seeds. Seeds with higher initial moisture and dried in higher temperature were more reluctant to deformation and cracking during dynamic test. This confirms a well known fact that seeds with high moisture content need to be dried in relatively low temperature at the beginning.

Krasucki w., Tys j., Szafran k., Rybacki r., Orlicki ł., 2002 – Influence of drying temperature on chemical composition of seeds of oilseed rape – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 427-438.

Rapeseed drying is one of the most essential elements in the group of activities defined as post-crop processing. Important changes appear in a difficult to define protein-fat-carbohydrate complex during the process of rapeseed drying depending on the applied temperature. The objective of this research was to specify the influence of different temperatures of rapeseed drying (80–180°C) on the content and composition of basic chemicals: crude fat, fatty acid, crude protein, ash, crude fibre and its fractions (NDF, ADF, ADL). The results of this research showed that the temperature of rapeseed drying considerably changed the content of basic components. The most important changes refer to crude fat and of fatty acid composition after the temperature of drying was exceeding 120°C. The temperature of drying over 150°C also caused important changes in the content of crude fibre and its fractions (considerable increase of NDF, ADF, ADL) but the total content of nitrogen-free extract (NFE) was lowered. The results of the test showed that high temperatures of rapeseed drying influenced not only the quality of oil but also lowered the food value of obtained side products as well.

## Oil

Zadernowski r., Nowak-Polakowska h., Pieńkowska h., Czaplicki s., 2002 – Effect of the method of fat extraction from seeds of evening primrose and borage on selected physicochemical properties and stability of oils – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 471-480.

The physicochemical parameters of oils pressed on a hydraulic press or expeller and extracted oils were determined in the studies. The experimental material were oils from seeds of evening primrose (*Oenothera paradoxa* H.) and borage (*Borago officinalis* L.). They were pressed on expeller "Komet", model CA/59 (Krup) and an industrial hydraulic press installed at Agropharm. Extraction was carried out by pouring hexane over seed pulp. The process was repeated six times. The physicochemical parameters of oils, including the index of refraction, acid value, peroxide value, iodine value, and colour were determined according to the Polish Standards. The other factors were determined by commonly applied methods, modified and adapted for the purpose of the present experiment. Local seed and oil heating was observed during pressing, especially in the case of evening primrose. It was caused by the fact that evening primrose seeds contained twice as much cellulose as borage seeds. The high cellulose level affected mechanical resistance of seeds and the quantity of thermal energy released during pressing. The quantitative and qualitative composition of the lipid fractions and unsaponifiable matter was determined to investigate the effect of the pressing and extraction methods on selected physicochemical properties of oils. A stability test was employed to determine the degree to which the keeping quality of oils depended on the way of their production. The results show that the physicochemical properties of oils pressed on a hydraulic press and expeller did not differ significantly. Pressed oils contained more  $\alpha$ -tocopherols than extracted oils. Evening primrose oil was more prone to oxidation than borage oil. Extracted oils were characterized by lower oxidative stability than pressed oils; the method of pressing had no influence on oil stability.

## Meal

Jędrusek-Golińska A., Korczak J., Kmiecik D., Czaczyk K., Heś M., 2002 – Defatted rapeseed meal as a raw material for production of protein hydrolysates – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 481-494.

Defatted rapeseed meal is used first of all for animal feeding. The attempts to use it in nutrition have been reported, for example for production of protein hydrolysates. However, this issue has not been investigated well enough. The aim of the study was to determine the conditions necessary for obtaining hydrolysates with good chemical and sensory evaluation. Five kinds of hydrolysates were produced. They differ from each other by temperature (105 or 121° C), and time of hydrolysis (6 or 12 h), hydrochloric acid concentration (4.5 or 6 M) or in degree of neutralization (pH 4.0 or 5.5). Additionally, rapeseed meal obtained from yellow seeds which contains more protein and less fiber than the black one was hydrolyzed. The content of protein, fiber, ash and dry matter were determined in both meals. Total nitrogen, amino nitrogen, salt, ash, dry matter and monosaccharides were determined in hydrolysates. The degree of protein hydrolysis and sensory properties were evaluated additionally. The results obtained for black meal show that the conditions of hydrolysis influenced the quantity of such indices as amino nitrogen (the highest value — 0.74 g/100 g was noticed for samples hydrolysed in 121° C) and monosaccharides: the lowest levels of glucose (0.87 g/L) and arabinose (0.21 g/L) were observed in samples hydrolysed in 121° C, the highest (5.86 g/L and 1.25 g/L, respectively) — in samples hydrolysed in 105° C (4.5 M HCl, 6 h, pH 5.5). The least quantities of salt (19.7%), ash (19.0%) and dry matter (28.2%) were determined in samples neutralized to pH 4.0 (105° C, 6 h, 4.5 M HCl), and the highest — in samples neutralized to pH 5.5 (22.6, 23.5 and 31.1%, respectively). The content of total nitrogen was rather constants. The hydrolysates from black or yellow defatted rapeseed meals differ from each other by content of monosaccharides (for instance glucose 4.7 and 7.32 g/L, respectively) and ash (21.3 and 20.7%, respectively). The defatted rapeseed meal seems to be a good source for production of protein hydrolysates which have a good nutritional value and some antioxidant effect.

Barowicz T., Migdał W., Pieszka M., 2002 – Chemical composition of colostrum and milk of sows fed linseed oil during gestation and lactation – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 495-500.

The aim of this study was the determination of chemical composition changes in colostrum and milk of sows receiving alimentary doses with addition of linseed oil in period of pregnancy and lactation. Experiment was carried out on 38 sows of pbz breed, randomly divided into two groups. Mixture for the group of control sows, fed in period from the 70th to 90th day of pregnancy as well as from 91st day of

pregnancy to 42nd day of lactation, contained 4% or 6% of blended fat, respectively. In experimental group in analogous periods sows were fed with mixture including 4 or 6% of linseed oil. Sows were fed in accordance with Normy Żywienia Świń (1993), using pelleted concentrated mixtures with free access to water from automatic water source. In order to analyse the chemical composition, samples of colostrum were collected 24 hours after outflow of placenta, however milk was collected 3 hours after morning feeding in the 5th and 22nd day of lactation. About 100 ml samples were gained over by hand milking of all mammary glands after previous intramuscular application of oxytocine. Basic chemical composition of colostrum and milk were estimated using classic methods with apparatus Milko-Scan 104, meanwhile composition of fatty acids was defined using method of gas chromatography with Varian 3400 apparatus. Substitutions of fatty supplies have no effect on the dry matter, protein, fat and ash content in studied samples. Control sows, receiving in mixtures addition of utilised fat produced colostrum containing higher concentration of lactose. Linseed oil enlarged the level of polyunsaturated fatty acids (PUFA), particularly from family *n-3*, in colostrum and also in milk.

Borowiec F., Micek P., Zajac T., Cwiek A., 2002 – Effect of feeding of thermally processed rape seeds on carcass quality indicators of lambs – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 501-514.

The aim of the study was to determine the effect of thermally processed rape seeds in concentrate mixtures for fattened lambs on the carcass dressing percentage, weight of main cuts, their chemical composition and fat thickness above loin and ribs. Additionally, the content of total cholesterol and fatty acid profile of meat were determined. The experiment was carried out on 40 lambs (initial body weight 23–24 kg), divided randomly into 4 groups. Animals were fed with meadow hay and concentrate mixtures: without rape seeds (control-I<sub>k</sub>) or with 22% of rape seeds either raw seeds (II<sub>RZ-S</sub>), heated seeds (III<sub>RZ-O</sub>) or steamed seeds (IV<sub>RZ-P</sub>). The highest daily gains, from the animals fed diets with rape seeds, had IV<sub>RZ-P</sub> and III<sub>RZ-O</sub> groups, and the lowest II<sub>RZ-S</sub> group. However, the differences among the groups were not significant ( $P > 0.05$ ). Both the supplement of oilseed rape and thermal processing of it did not have any influence on its carcass dressing percentage, weight of individual cuts, the loin eye area or fat thickness above loin and ribs ( $P > 0.05$ ). Statistically proofed increase in fat proportion in weight of longissimus dorsi and thigh ( $P < 0.05$ ) of the animals fed diets with rape seeds were shown. At the same time the meat of these animals contained less total cholesterol ( $P > 0.05$ ) and C<sub>16:0</sub> and more C<sub>18:1</sub> and C<sub>18:3</sub>, compared with the control group ( $P < 0.05$ ).

Osek M., Janocha A., Wasilowski Z., 2002 – Rearing results, slaughter value and meat quality of broiler chickens feed mixtures without animal protein containing seeds of oil plants – *Rośliny Oleiste - Oilseed Crops* n° XXIII (2), p. 515-530.

In this experiment the slaughter value and quality of meat of broiler chickens were evaluated. The chickens were fed with mixtures of Starter (21 days) and Grower (21 days) out of which animal protein was eliminated and rapeseed were introduced to (R) group (5/10%) and linseed (6/11%) to (L) group. Control mixtures contained meat meal. It was proved that the kind of used mixtures did not statistically significantly ( $p \leq 0.05$ ) influence body weight of birds after 42 days of rearing (2110, 2150 and 1997 g) and conversion of feed (1.84, 1.81 and 1.97 kg) and nutrients use per 1 kg gain. In group receiving mixtures with linseed results was the worse (difference about 5–8% in relation to remaining). Chicken worse digested nutrients (with exception of crude protein) only from Starter mixtures containing in composition seeds of oil plants, which decreased their energy values about 0.65 (R) and 1.12 MJ EM<sub>N</sub> (L) in comparison to control mixture. The lowest (241 points) rearing efficiency index (REI) were characterised chickens fed mixtures with linseeds, but their post slaughter value was the best. It shows the highest dressing percentage (75.7) least fatness (12.7% skin with subcutaneous fat and 1.4% abdominal fat in carcass in relation to 15.1% and 2.7% at control birds), large (43%) share of muscles in cold carcass, the best proportions of fatty acids in lipids of muscles (SFA/PUFA – 1.5 : 1 and PUFA *n-6/n-3* 1.5 : 1 to 2 : 1, and also very high estimation of its tasty quality (4.5 in scale 5). In group of chicken fed mixtures with rapeseeds the best productive results were obtained, instead postslaughter results were between group K and L. On base of obtained results can be recommended to use in feeding of slaughter chicken mixtures without animal protein, but containing in their composition oilseeds especially in aim to improve dietetic value of meat.