

## Changes in some physical properties of soil during vegetation period of winter rape

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**Abstract:** *Changes in some physical properties of soil during vegetation period of winter rape.* Analysis of changes in soil volumetric density and water-air properties during vegetation period of winter rape is presented. Investigations were carried out in 2004/2005 season on the object without outfit passages (compact plants) and with passages (paths). It was found that the biggest changes in soil compaction on the paths (almost 60% of the final state) were caused by the first passage of seeding outfit. As a result of soil compacting, in differential porosity the volume of pores of diameter > 30 µm decreased significantly, while the volume of pores of diameter < 3 µm increased slightly

*Key words:* rape, soil compaction, general porosity, differential porosity.

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## Effect of auxiliary plough elements on ploughing quality

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**Abstract:** *Effect of auxiliary plough elements on ploughing quality.* Investigations on the effect of cutter and scraper on ploughing quality was carried out in a soil bin. There was found a significant effect of investigated auxiliary elements on ploughing quality parameters: ridge throw and indices of soil thickness irregularity and soil loosening. The biggest changes in soil thickness irregularity were found in all investigated measuring variants.

*Key words:* soil bin, ploughing quality, cutter, scraper.

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## Estimation of efficiency of oat nitrogen top-dressing

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**Abstract:** *Estimation of efficiency of oat nitrogen top-dressing.* The reaction of three oat varieties to application of nitrogen top-dressing was investigated. The increases in grain productivity and quality were found, together with higher grain germination ability. The most effective utilization of nitrogen was observed for oat variety Argamak, which showed also best percentage of kernels in the panicle and panicle efficiency.

*Key words:* oat, fertilizing, nitrogen efficiency, grain productivity, grain quality

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## Application of soil electrical conductivity and granulometric composition assessment to provide site-specific variability of soil conditions

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**Abstract:** *Application of soil electrical conductivity and granulometric composition assessment to provide site-specific variability of soil conditions.* Results of soil electrical conductivity measurement and granulometric composition determination are presented. The soil electrical conductivity (EC) was determined with the use of conductometer KTN-6. The obtained EC values ranged between 1.9 mS·cm<sup>-1</sup> and 10.6 mS·cm<sup>-1</sup> (for the depth range 0-30 cm), and between 2.4 mS·cm<sup>-1</sup> and 20.1 mS·cm<sup>-1</sup> (for the depth range 0-90 cm). The upper layer (0-30 cm) average value presented 5.1 mS·cm<sup>-1</sup> and the soil profile 0-90 cm was characterized by the average value of 10.1

m-S<sup>-1</sup>.

*Key words:* soil electrical conductivity, granulometric composition, GPS, precision farming.

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## Suppleness of energetic plants to chopping

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**Abstract:** *Suppleness of energetic plants to chopping.* The work aimed at investigating the length distribution of energetic plants broken up in a chopping unit of the forage harvester. The chopped plant particles of: *Salix viminalis*, *Rosa multiflora*, *Miscanthus sinensis gigantean*, *Polygonum sachalinense*, *Spartina pectinata*, *Sida hermaphrodita* and *Helianthus tuberosus* were taken as research material. The differences in distribution of particle length were the species feature of energetic plants. The length distribution of chopped *willow particles* showed the highest mean value and good regularity, while the *Helianthus tuberosus* mixture was shortest and most irregular. Differences between mean values of particle length calculated by geometric mean method and according to Rosin-Rammler method were lower than standard deviation values, while connectivity between these values was very high ( $R = 0.994$ ).

*Key words:* energetic plants, sieve separator, chopping, particle length.

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## Analysis of the effects of fodder wagon application in milk cattle feeding

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**Abstract:** *Analysis of the effects of fodder wagon application in milk cattle feeding.* The work aimed at analysis of advantages connected to providing the milking farms with fodder wagons. The economic, environmental and labour input criteria connected with feeding the cows with complete feed with the use of fodder wagon were analyzed. Two farms specialized in milk production were selected for detailed analysis. The results pointed out that feeding the animals with complete feed TMR with the use of fodder wagon caused a distinct increase in milk production per cow. It was calculated that the purchase costs of fodder wagon were repaid after 1.5-2.5 years in analyzed farms.

*Key words:* cost, fodder wagon, milking productivity.

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## The reduction of harmful exhaust gases from diesel engines for the agricultural application through installing a plasma reactor in the exhaust system

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**Abstract:** *The reduction of harmful exhaust gases from diesel engines for the agricultural application through installing a plasma reactor in the exhaust system.* Investigations on application of a specially designed plasma reactor in diesel engine exhaust system are presented. The bench tests of plasma reactor were carried out for the four-cylinder D-243 diesel engine in order to determine characteristic engine parameters. It was found that application of plasma reactor enabled to decrease concentration of NO<sub>x</sub> by 9,3-12,8% and the power spent on gas purification by 1.53 kW. Therefore, a plasma reactor will provide a decrease in the annual diesel fuel consumption for non-technological operations by up to 405.6 litres and to achieve the annual economic benefit up to 910.9 USD for one engine.

*Key words:* diesel engine, exhaust gases, plasma reactor.

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## **Analysis of age and size structure of chain saws used in the selected regions of Poland**

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**Abstract:** *Analysis of age and size structure of chain saws used in the selected regions of Poland.* In the second half of 2007 there were carried out survey investigations aiming at determination of the technical equipment stock in forest service plants operating within the area of Regional Management of State Forests in Krosno, Olsztyn and Szczecin. The investigations covered 83 forest inspectorates out of 95 and there were involved 576 forest service plants out of 636. In these plants 3875 chain saws were used, including 3001 of Husqvarna make (77.4%), 813 of Stihl make (21.0%) and 61 of other producers (1.6%). The average chain saw age amounted to 1.89 year, while it varied in forest inspectorates from 0.37 to 5.49 year. The medium group of chain saws was predominant and made 85.3%.

*Key words:* forestry, chain saw, exploitation, forest operations.

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## **Logging mechanisation in the Czech Republic**

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**Abstract:** *Logging mechanisation in the Czech Republic.* Development of logging mechanisation in Czech Republic is presented in the paper. It is illustrated with the examples of particular mechanical devices introduced to logging operations in the past. It is concluded that the possible application of modern harvester technology amounts at present to about 60% of the allowable cut.

*Key words:* logging, mechanisation, Czech Republic.

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## **Convictional drying of chips for energy purposes**

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**Abstract:** *Convictional drying of chips for energy purposes.* Investigations aimed at determination of the effect of drying medium temperature on moisture content of material being dried. Investigations were carried out in a convictional drier with forced air flow at the following temperature: 40, 50, 60, 70 and 80°C. The results are presented graphically. The authors described drying process and the effect of moisture content on the pine chips' calorific value designed for energy purposes.

*Key words:* biomass, drying, calorific value, moisture content, chips.

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## **Three-phase extraction of European larch seeds in the local kiln and laboratory**

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**Abstract:** *Three-phase extraction of European larch seeds in the local kiln and laboratory.* The process of European larch seed extraction in the kiln in Czarna Białostocka and in KMRiL SGGW laboratory is compared and described with the use of mathematical equations. It was found that duration of particular process phases connected to water content reduction, opening of cones and seed extraction were shorter under laboratory conditions.

*Key words:* process, seed extraction, European larch.

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## Sources of nitrous oxide emission in agricultural sector in Poland

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**Abstract:** *Sources of nitrous oxide emission in agricultural sector in Poland.* The paper describes how Poland fulfils its obligations of Kyoto Protocol in relation to nitrous oxide emission as one of the greenhouse gases. The scope of work is limited to agricultural sector only. There are presented the sources of greenhouse gas (GHG), divided into groups according to methodic and classification of IPPC (Intergovernmental Panel on Climate Change); the sources of nitrous oxide emission of agricultural sector are analyzed. The nitrous oxide emissions of 2003 in agricultural sector were analyzed in details, basing on annual listing related to the previous year and the base year 1988.

*Key words:* agricultural sector, nitrous oxide, N.O emission sources, greenhouse gas.

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## Mathematical model of Jeffcott rotor supported on slide bearings assembly

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**Abstract:** *Mathematical model of Jeffcott rotor supported on slide bearings assembly.* Rotating stability of the Jeffcott rotor assembled on the slide bearings was described by a system of differential equations of motion. The assembly of slide bearing was modeled with a classical spring and damper model. In the mathematical model we assumed that the bearing was partially lubricated and defined with the *Sommerfeld number*. A shaft precession trajectory and stability condition of its rotating in the slide assembly were solved.

*Key words:* slide bearing, rotor stability, mathematical model.

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## Application of non-stationary viscous flow on the basis of final elements method with the use of square-law basic functions

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**Abstract:** *Application of non-stationary viscous flow on the basis of final elements method with the use of square-law basic functions.* The results of numerical analysis on the air flow movement in crushing chamber and bypass channel of the grain crusher are presented. The analysis was based on final elements method with the use of square-law basic functions. The obtained results of calculations were compared to experimental data.

*Key words:* non-stationary viscous flow, final elements method, square-law basic functions.

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