

MODELING SOME DRYING CHARACTERISTICS OF CANTALOUPE SLICES

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ABSTRACT. This study investigated thin layer drying of cantaloupe slices under different drying conditions with initial moisture content about 18.53 (d.b.). Air temperature levels of 40, 50, 60 and 70°C were applied in drying of samples. Fick's second law in diffusion was applied to compute the effective moisture diffusivity (D_{eff}) of cantaloupe slices. Minimum and maximum values of D_{eff} were 4.05×10^{-10} and 1.61×10^{-9} m²/s, respectively. D_{eff} values increased as the input air temperature was increased. Activation energy values of cantaloupe slices were found between 30.43 and 36.23 kJ/mol for 40°C to 70°C, respectively. The specific energy consumption for drying cantaloupe slices was calculated at the boundary of 1.01×10^5 and 9.55×10^5 kJ/kg. Increasing in drying air temperature in different air velocities led to increase in specific energy value. Results showed that applying the temperature of 70°C is more effective for convective drying of cantaloupe slices. The aforesaid drying parameters are important to select the best operational point of a dryer and to precise design of the system.

Key words: Drying; Moisture diffusivity; Cantaloupe; Kinetic; Activation energy.

CONTACT AREA DETERMINATION OF AGRICULTURAL TRACTOR WHEEL WITH SOIL

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ABSTRACT. The study is established based on contact area determination of tractor wheel. The significance of contact area in domain of wheel-soil interactions is considerable. Requirement for contact area estimations has prompted the researchers to determine numerous theoretical models. In this study, an experimental test was conducted inside a soil bin facility providing entirely reliable and controlled condition for the test. The soil bin included a carriage, a single wheel-tester and a frame. The utilized tire was a towed Good year 9.5L-14, 6 radial ply agricultural tractor tire which is used in John Deere tractors This test has the advantage of utilizing images taken of the contact areas and subsequently, using a plantimeter to obtain the values of contact area precisely. Test variables were the two most prominent and influential parameters i.e. tire inflation pressure in three levels (i.e. 100, 150, and 290 kPa) and vertical load applied on wheel in three levels (i.e. 1962, 2943, and 3924 N). The acquired results revealed that there is an increase in contact area induced by increase of vertical load and decrease of contact pressure. Contact area is shown to be highly influenced by vertical load in reduced tire inflation pressures.

Key words: Contact area; Wheel; Soil bin; Tire.

EFFECT OF TEMPERATURE ON ADHESION OF CLAY SOIL TO STEEL

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ABSTRACT. Soil adhesion is one of the important factors in measuring the amount of energy consumption. In this paper, the effect of temperature on the amount of clay soil adhesion was investigated. The soil used in this research was saturated clay mud. In order to measure adhesion, a specific instrument was designed. The dimensions of the metal plate were 210×70×20 mm and its weight was 2.5 kgf. The metal plate alloy was st37. The adhesion was calculated from the difference between weight of water used for clearing the metal plate of the soil and the weight of the metal plate. Six levels of temperature from 5 to 30°C were applied. A refrigerator and an oven were used for getting the required temperature. The test was performed three times for each level. Results showed that an increase in temperature from 5 to 30°C decreases the soil adhesion. Three equations such as linear polynomial, exponential and quadratic polynomial correlated with the experimental data and the result showed that the quadratic polynomial model had the best correlation with experimental data.

Key words: Soil adhesion; Energy consumption; Clay soil; Correlation.

LONG-TERM EFFECT OF FERTILIZER AND CROP RESIDUE ON SOIL FERTILITY IN THE MOLDAVIAN PLATEAU

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ABSTRACT. Since 1965, at the Agricultural Research Station of Podu-Iloaiei, Iași County, Romania (47°12' N latitude, 27°16' E longitude), investigations were conducted on the influence of different fertilizer systems on production and soil fertility. For wheat and maize crops, placed in a three-year rotation (pea - wheat - maize), three fertilization systems were experienced: (1) mineral fertilization with nitrogen and phosphorus rates until $N_{140}P_{100}$; (2) manure fertilization (20, 40, and 60 t/ha), with and without mineral fertilization and (3) mineral fertilizers + hashed residue applied in autumn under the base ploughing. The paper presented the results of investigations concerning the influence of long-term fertilization (46 years) on some chemical characteristics of Cambic Chernozem from the Moldavian Plateau. The climatic conditions in the Moldavian Plain were characterized by annual mean temperature of 9.6°C and a mean rainfall amount, on 50 years, of 553.5 mm, of which 141.5 mm during September-December and 412.0 mm during January-August. After 46 years of experiences, in pea-wheat-maize crop rotation, the content of organic carbon from soil has decreased by 22.3% (4.2 g/kg soil) at the unfertilized control and by 14.4% (2.7 g/kg soil) at the rate of $N_{120}P_{80}$. In wheat and maize, nitrogen uptake by weeds was between 7 and 9.5 kg/ha from all the plots. Applying moderate rates of mineral fertilizers ($N_{80}P_{60}$), together with 6 t/ha wheat straw or 40 t/ha manure, has determined the increase in organic carbon content from soil by 0.5 and, respectively, 2.8 g/kg.

Key words: Slope land; N P K fertilizer; Crop residues; Organic carbon; Pea-wheat-maize rotation

REZUMAT. Efectul de lungă durată al îngrășămintelor și resturilor vegetale asupra fertilității solului în Podișul Moldovei. Începând cu anul 1965, la Stațiunea de Cercetări Agricole Podu-Iloaiei, județul Iași (47°12' N latitudine, 27°16' E longitudine), cercetarile efectuate au urmărit influența diferitelor sisteme de fertilizare asupra producției și a fertilității solului. Pentru culturile de grâu și de porumb, amplasate într-o rotație de trei ani (mazăre - grâu - porumb), au fost experimentate trei sisteme de fertilizare: (1) minerală cu azot și fosfor, cu doze de până la $N_{140}P_{100}$; (2) fertilizarea cu gunoi de grajd (20, 40, și 60 t / ha), cu și fără fertilizare minerală și (3) îngrășămintă minerale + resturi vegetale, aplicate în toamnă, sub arătura de bază. Lucrarea prezintă rezultatele cercetărilor privind influența fertilizării de lungă durată asupra unor însușiri chimice ale cernoziomului cambic din Podișul Moldovei. Condițiile climatice din Câmpia Moldovei se caracterizează prin temperaturii medii anuale de 9.6°C și o cantitate medie de precipitații, pe 50 de ani, de 553,5 mm, din care 141,5 mm în perioada septembrie-decembrie și 412 mm în perioada ianuarie-august. După 46 de ani de experimentare, în rotația culturilor mazăre-grâu-porumb, conținutul de carbon organic din sol a scăzut cu 22,3% (4,2 g/kg sol) la varianta martor nefertilizată și cu 14,4% (2,7 g / kg sol) la doza de $N_{120}P_{80}$. La culturile de grâu și porumb, cantitățile de azot consumate de buruieni au fost cuprinse între 7 și 9,5 kg / ha la toate variantele. Aplicarea unor doze moderate de îngrășămintă minerale ($N_{80}P_{60}$), împreună cu 6 t/ha paie de grâu sau cu 40 t/ha gunoi de grajd, a determinat creșterea conținutului de carbon organic din sol cu 0,5 și, respectiv, 2,8 g / kg.

Cuvinte cheie: teren în pantă; fertilizare cu NPK; resturi vegetale; carbon organic; rotația mazăre-grâu-porumb.

SEED RESERVE UTILIZATION AND SEEDLING GROWTH OF TREATED SEEDS OF MOUNTAIN RYE (*SECALE MONTANUM*) AS AFFECTED BY DROUGHT STRESS

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ABSTRACT. The environmental stress such as, drought are serious obstacles for field crops in further areas of the world, especially in arid and semiarid regions. In order to investigate drought stress on seed reserve utilization and seedling growth of treated seeds of mountain rye (*Secale montanum*), an experiment was carried out. Factorial experiment was carried out in completely randomized design with three replications. The first factor was the seed treatments (unpriming, hydropriming and osmopriming) and the second factor was drought stress. To create drought stress, polyetylen glycol 6000 (PEG 6000) in osmotic levels at 0 (as control), -0.4, -0.8, -1.2 and -1.6 MPa were used. The results indicated that for these traits: germination percentage (GP), timson index (TI), energy of germination (EG), weight of utilized (mobilized) seed (WMSR), seed reserve utilization efficiency (SRUE), seedling dry weight (SLDW), and seed reserve depletion percentage (SRDP), was a significant treatment × drought interaction. Thus hydropriming and osmopriming improvement study traits in *Secale montanum* under drought stress. While in higher osmotic pressure the highest seed reserve utilization were obtained from osmopriming.

Key words: Drought; Seed reserve; Seedling; Priming; *Secale montanum*.

POLLINATORS VISITING SESAME (*SESAMUM INDICUM* L.) SEED CROP WITH REFERENCE TO FORAGING ACTIVITY OF SOME BEE SPECIES

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ABSTRACT. A study was conducted to determine the insect pollinator orders visiting sesame, fluctuation percent of Hymenopterous fauna during flowering period, foraging activity of the pollinating insects belonging to Hymenoptera, Coleoptera, Lepidoptera and Diptera orders and foraging activity of *Apis mellifera*, *Anthidium* sp. and *Xylocopa* sp. from July 15 to September 4, 2011 at four time periods i.e., 9-11 am, 11-1 pm, 1-3 pm and 3-5 pm. Results revealed that insect percentage of Hymenoptera order was high followed by Lepidoptera, Diptera and Coleoptera. The highest activity of Hymenopterous fauna was in fourth week of flowering period and decreased gradually in the last weeks. Total number of pollinators was highest at 9-11 am followed by that at 11-1 pm, 1-3 pm and 3-5 pm. Among the bees, the number of *Apis mellifera* was the maximum followed by *Xylocopa* sp. and lastly *Anthidium* sp. at all time periods. It was also evident that temperature, wind and relative humidity also affect the percentage of insects visiting sesame flowers.

Key words: Sesame; Pollinators; Foraging activity.

GENETIC DIVERSITY OF *BRENNERIA NIGRIFLUENS* STRAINS IN NORTH OF IRAN (MARGIN OF CASPIAN SEA)

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ABSTRACT. *Brenneria nigrifluens*, the cause of shallow bark canker of Persian walnut trees (*Juglans regia* L.), has become fairly widespread in Iran in recent years. It is regarded as a great threat to walnut production. To determine the diversity of *B. nigrifluens* strains, sixty strains of the causal bacterium were isolated from bark samples of infected walnut trees collected from Mazandaran, Guilan and Golestan provinces and were studied. The physiological and biochemical characteristics, electrophoretic patterns of total cell proteins and rep-PCR generated DNA fingerprints of *B. nigrifluens* strains were compared. Strains appeared to be more or less similar in phenotypic characteristics. Less than 15% of the strains differed in a few phenotypic features such as the ability in production of H₂S from peptone, hydrolysis of esculin, levan production, arginine dehydrolase, nitrate reduction, indol production and methyl red reaction. These differences did not show any special distribution and therefore was not suitable for classifying the strains into distinct groups. The electrophoretic patterns of cell proteins of the strains were different from each other and were only useful for preliminary grouping of the isolates. The groups of strains were differentiated by their rep-PCR fingerprints and on which basis they were placed in six groups in similarity level 95%. Cluster analysis was performed using NTSYSpd software. The results of these studies demonstrated that the populations of *B. nigrifluens* in North of Iran are genetically heterogeneous. The results can be used in selection of disease management strategies.

Key words: Shallow bark canker; Persian walnut; REP-PCR.

STUDY REGARDING EFFECTIVENESS OF SOME PLANT EXTRACTS AND DIFFERENT PESTICIDES AGAINST AN *ERWINIA AMYLOVORA* (BURRILL.) WINSLOW *ET AL.* STRAIN ISOLATED FROM QUINCE

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ABSTRACT. The interest in management fire blight prevention and control increased considerably in last years due to pathogen spread almost throughout the country. The objective of this paper focuses on testing of some plant extracts such as *Salvia officinalis*, *Thymus serpyllum*, *Pelargonium odoratissimum*, *Hedera helix*, *Ocimum basilicum*, *Levisticum officinale*, *Tagetes patula*, *Galium verum* and different pesticides against an *Erwinia amylovora* strain isolated from quince damaged samples. In this study, the biological material was represented by quince shoots, harvested from pomological collection of "Vasile Adamachi" farm, which belongs to University of Agricultural Science and Veterinary Medicine Iași. The research were performed in the Phytopathology laboratory. Following the experiment performed note that among the eight plant extracts a good antibacterial activity has *Pelargonium odoratissimum*, *Ocimum basilicum* and *Salvia officinalis* and of the three pesticides, Alcupral 50 PU. Contrary to expectations worst results were obtained after testing Aliette 80 WG and *Hedera helix* products. The results were estimated statistically, by performing ANOVA test.

Key words: Fire blight; Plant extracts; *Hedera helix*, Alcupral 50 PU.

REZUMAT. Studiul privind eficacitatea unor extracte din plante și pesticide asupra unei sușe de *Erwinia amylovora* (Burrill.) Winslow *et al.*, izolată de pe gutui. Interesul pentru managementul prevenirii și combaterii focului bacterian al rozaceelor a crescut considerabil în ultimii ani, ca urmare a răspândirii patogenului pe aproape întreg teritoriul țării noastre. Obiectivul acestei lucrări are în vedere testarea unor extracte din plante precum *Salvia officinalis*, *Thymus serpyllum*, *Pelargonium odoratissimum*, *Hedera helix*, *Ocimum basilicum*, *Levisticum officinale*, *Tagetes patula*, *Galium verum* și a unor molecule active, asupra unei sușe de *Erwinia amylovora*, izolată din lăstarii de gutui, ce prezentau simptome tipice atacului de foc bacterian. Materialul luat în studiu a fost recoltat din ferma "Vasile Adamachi" din cadrul Universității de Științe Agricole și Medicină Veterinară Iași, iar cercetările s-au efectuat în laboratorul de cercetare al disciplinei de Fitopatologie. În urma experimentului efectuat se observă că, dintre cele opt extracte de plante, cea mai bună activitate antibacteriană o prezintă *Pelargonium odoratissimum*, *Ocimum basilicum* și *Salvia officinalis*, iar dintre cele trei pesticide, Alcupral 50 PU. Contrar așteptărilor, cele mai slabe rezultate s-au obținut în urma testării produselor Aliette 80 WG și *Hedera helix*. Rezultatele au fost interpretate statistic, folosind testul ANOVA.

Cuvinte cheie: focul bacterian; extracte din plante; *Hedera helix*; Alcupral 50 PU.

MAPPING VITICULTURAL POTENTIAL IN TEMPERATE CLIMATE AREAS. CASE STUDY: BUCIUM VINEYARD (ROMANIA)

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ABSTRACT. The paper presents the spatial distribution of ecological suitability for grape growing in Bucium vineyard (Romania), viticultural area with ecological characteristics representative for northern vineyards. The study is based on a complex methodology implying use of *remote sensing*, *Geographical Information Systems (GIS)*, *climatic data*, *topographic and pedologic maps*. Research reveal the low ecological potential of Bucium area, specialized, traditionally, in white table wines, sparkling wines and white quality wines. Data analysis shows that 30% of Bucium vineyard (281 ha of 928 ha) is inappropriate, in terms of climatic suitability, for *vinifera* varieties culture; 34% of the area (316 ha) has limited ecological potential, enough to produce white table wines and sparkling wines; 36% of the area (331 ha) is suitable for quality white wines. In the vineyard area was not registered suitable conditions for quality red wines production. Huglin's heliothermal index values shows that the vineyard has climatic characteristics that allow culture of wine varieties with early and medium ripening. In terms of ecological suitability, it appears that the most favorable conditions offer Cetățuia wine land, the eastern slope of the Doi Peri hill, eastern slope of Vișani hill, south-western slope of Bucium hill and southern slope of Pietrăria wine land.

Key words: Vineyard; Geographic Information Systems; Site suitability; Climatic factors; Spatial distribution.

REZUMAT. Cartografierea potențialului viticol în arealele cu climat temperat. Studiu de caz: centrul viticol Bucium (România). Lucrarea prezintă distribuția spațială a favorabilității ecologice pentru cultura soiurilor de vin în centrul viticol Bucium-podgoria Iași, areal cu caracteristici ecologice reprezentative pentru podgoriile septentrionale. Cercetarea se bazează pe o metodologie complexă, în cadrul căreia se utilizează imagini din satelit, Sistemele Informaționale Geografice (GIS), date climatice, hărți topografice și hărți pedologice. Rezultatele cercetării relevă potențialul ecologic limitat al arealului viticol, specializat, în mod tradițional, în producerea vinurilor albe de masă, vinurilor spumante, vinurilor aromate și vinurilor albe de calitate. Din analiza datelor rezultă că 30% din suprafața analizată (281 ha din 928 ha) este improprie, din punct de vedere climatic, pentru cultura soiurilor *vinifera*; 34% din suprafață (316 ha) are potențial ecologic limitat, suficient doar pentru producerea vinurilor albe de masă și vinurilor spumante; 36% din suprafață (331 ha) are potențial pentru producerea vinurilor albe de calitate. În arealul viticol nu se înregistrează condiții favorabile obținerii vinurilor roșii de calitate. Valorile indicelui heliotermic Huglin, a cărei distribuție spațială este prezentată în lucrare alături de amplasarea zonelor afectate de înghețuri și brume, relevă faptul că, în areal, există condiții favorabile pentru cultura soiurilor cu maturare timpurie și mijlocie. Din punct de vedere al favorabilității ecologice pentru cultura soiurilor de vin, rezultă că cele mai valoroase microareale sunt: plaiul Cetățuia, versantul estic al dealului Doi Peri, versantul estic al dealului Vișani, versantul sud-vestic al dealului Bucium și versantul sudic al plaiului Pietrăria.

Cuvinte cheie: podgorie; Sisteme Informaționale Geografice; potențial viticol; factori climatici; distribuție spațială.

DETECTION OF ORF VIRUS AND PAPILLOMAVIRUS OUT OF SAMPLES FROM GOATS AND CATTLE WHICH WERE GATHERED BY MULTIPLEX PCR ROMANIA

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ABSTRACT. The lesions which appear on the skin and are caused by parapoxvirus, herpesviruses and papillomavirus, depending on they're gravity, can produce large economic losses. The identification of viral species with different laboratory methods can facilitate making a correct diagnostic in identifying the infectious entity. The most common encountered injuries , especially on goats and kids, have an oral location, breasts, eyes and genital and podal. On the other side on cattles infected with papillomavirus the lesions are multiple and spread all over the body. To identify the etiologic agent from goats and cattle with skin lesions, tissue samples were collected and scabs. The virus identification was made with moleculal biology techniques. The PCR method revealed the viral DNA, thus identifying a portion of the B2L preserved gene which is then amplified using primers PPP1-PPP4. For papillomavirus detection, primers FAP59 and FAP 64 were used to conserve the L1 human gene, primers that can help detect other types of papillomavirus from other species. The PCR results showed that lesions from goats were made by Orf virus, a virus that belongs to the papillomavirus gene, as for cattles the bovine papillomavirus. Studies have shown that PCR is a rapid laboratory method which can be used to identify the viral agent that causes severe skin lesions.

Key words: Viruses; PCR; Primers; Injuries.

REZUMAT. Detectarea virusului Orf și a papilomavirusului din probele recoltate de la caprinele și bovinele din Romania prin multiplex PCR. Leziunile care apar la nivelul pielii, determinate de parapoxvirusuri, herpesvirusuri și papillomavirusuri, în funcție de gravitatea lor, pot produce mari pierderi de natură economică. Identificarea speciilor virale prin diferite metode de laborator poate ușura, astfel, punerea unui diagnostic precis în identificarea entităților infecțioase. Cele mai frecvente leziuni întâlnite, în special la capre și iezi, au localizare bucală, peribucală, mamară, oculară, podală și genitală. În schimb, la bovinele infectate cu papillomavirus, leziunile sunt multiple și dispersate pe tot corpul. Pentru identificarea agentului etiologic de la capre și bovine cu leziuni la nivelul pielii s-au recoltat probe de țesut și cruste. Identificarea virusului s-a făcut prin tehnici de biologie moleculară. ADN viral a fost pus în evidență prin metoda PCR, identificându-se, astfel, o porțiune a genei conservate B2L, amplificată, apoi, cu ajutorul primerilor PPP1 – PPP4. Pentru detectarea papillomavirusului s-au folosit primerii FAP59 și FAP64, utilizați pentru conservarea genei L1 de tip uman, primeri cu care se pot detecta și alte tipuri de papillomavirus de la alte specii. Rezultatele obținute în urma PCR-ului și a secvențializării au demonstrat că leziunile de la capre au fost produse de virusul Orf , virus ce face parte din genul Parapoxvirus, iar la bovine de Bovine papillomavirus. Studiile au demonstrat că PCR este o metodă de laborator rapidă și poate fi utilizată pentru identificarea agentului viral ce determină leziuni grave la nivelul pielii.

Cuvinte cheie: virusuri; PCR; primeri; leziuni.