DETERMINATION OF THE SUPER-ELLIPTIC SHAPE OF TIRE-SOIL CONTACT AREA USING IMAGE PROCESSING METHOD

R. FARROKHI TEIMOURLOU, H. TAGHAVIFAR

ABSTRACT. The present study is aimed at determination of the super-elliptic shape of tire-soil contact area using image processing method. Contact area has a substantial role on determination of soil compaction and tractive parameters of agricultural tractors. A very well-known model in this realm is to describe the contact area with superellipse geometry. A soil bin testing facility equipped with a single-wheel tester was utilized to conduct the needed experiments. The experiments were carried out at three levels of wheel load, three levels of tire inflation pressure with three replicates in a completely randomized block design. Corresponding images were taken for each of the experiments and the images were processed accordingly. The contact length and width were determined using imdistline command in MATLAB commercial software. This experiment was conducted at three levels of wheel load (2, 3, and 4 kN), and three levels of tire inflation pressure (100, 200, and 300 kPa) with three replications. The aforementioned parameters were applied consequently in the superellipse model and the contact area was computed. The obtained results disclosed that increase of wheel load increases the contact area. Contradictory, increment of tire inflation pressure reduces the formed contact area. Additionally, the potential of contact area determination with the proposed model was compared with that of actual values, which denoted coefficient of determination equal to 0.96, which shows the promising ability of the proposed model and the appropriateness of describing contact area with superellipse geometry.

Key words: Contact area; Image processing; Soil; Superellipse; Tire.

GIS-BASED FLOW ROUTING WITH THE DISTRIBUTED HYDROLOGICAL WETSPA MODEL IN THE ZIARAT RIVER BASIN - GORGAN, IRAN

N. JAVIDAN, A. BAHREMAND

ABSTRACT. The GIS-based distributed hydrological model, WetSpa, whose flow routing method is described in this paper is suitable for flood prediction and watershed management on catchment scale. The model predicts outflow hydrographs at the basin outlet or at any converging point in the watershed, and it does so at a user-specified time step. The model is physically based, spatially distributed and time-continuous.This paper focuses on the GIS-based diffusive transport approach for the determination of rainfall runoff response and flood routing through a catchment. The watershed is represented as a grid cell mesh, and routing of runoff from each cell to the basin outlet is accomplished using the first passage time response function based on the mean and variance of the flow time distribution, which is derived from the advection–dispersion transport equation.The flow velocity is location dependent and calculated in each cell by the Manning equation based on the local slope, roughness coefficient and hydraulic radius. The hydraulic radius is determined according to the geophysical properties of the catchment and the flood frequency. The total direct runoff at the basin outlet is obtained by superimposing all contributions from every grid cell. The model is tested on the

Ziarat _Gorgan watershed with 4years of observed hourly rainfall and discharge data, and the results are in excellent agreement with the measured hydrograph at the basin outlet.

Key words: Diffusive wave; Unit hydrograph; Geographical information system; Flood modeling; WetSpa model.

EVALUATION OF PHYSIOLOGICAL TRAITS, YIELD AND YIELD COMPONENTS AT TWO GROWTH STAGES IN 10 DURUM WHEAT LINES GROWN UNDER RAINFED CONDITIONS IN SOUTHERN SYRIA

M. ALMESELMANI, A. AL-RZAK SAUD, K. AL-ZUBI, S. AL-GHAZALI, F. HARERI, M. AL-NASSAN, M.A. AMMAR, O.Z. KANBAR, H. AL-NASEEF, A. AL-NATOR, A. AL-GAZAWY, J.A. TEIXEIRA DA SILVA

ABSTRACT. Water stress, which limits the distribution and productivity of durum wheat (*Triticum durum* Desf.) in the Mediterranean region, is also considered to be a major factor reducing yield in semiarid regions. Improving drought resistance is thus an important objective in plant breeding programs for rainfed agriculture. The current study was carried out to identify drought-tolerant durum wheat lines among 10 lines and one variety (Douma1, the control) in the first and second settlement zones in the Southern part of Syria and to recognize the most important physiological parameters associated with drought tolerance. Membrane stability index, chlorophyll (chl) content, relative water content and chl fluorescence were recorded at the vegetative and anthesis stages, as were yield and yield components. Data recorded at vegetative and anthesis stages in both zones showed that there were significant differences between all lines growing in the first and second settlement zones and that all characters in the second zone were significantly lower than those in the first zone. Line 1 was superior to Douma1 in terms of membrane stability index, relative water content, chl content and chl florescence, also showing better yield and higher total plant biomass, tiller number/m^2, 1000 grain weight and grain number/ear than the control. The ability of wheat cultivars to perform reasonably well in variable rainfall and water-stressed environments is an important trait since it allows for stable production under drought stress. Moreover, prior to genetic manipulation, it is important to characterize the physiological parameters of known drought-tolerant or drought-sensitive wheat cultivars with the objective of better understanding their physiological responses under drought.

Abbreviations: F_v/F_m (Maximum quantum yield of PS II derived form chlorophyll fluorescence measurements); MSI (membrane stability index); RWC (relative water content); TGW (1000 grain weight).

Key words: Chlorophyll; F_v/F_m; Membrane stability; Rainfed; Relative water content; Wheat; Water deficit

ANALYSIS OF ALLELIC VARIATION IN HMW-GLU-1 GENE BLOCKS IN IRANIAN WHEAT CULTIVARS USING ALP MOLECULAR MARKER

Y. SHIRI, M. SOLOUKI, M. FOROOTAN

ABSTRACT. In order to study the allelic variation of Glu-1 gene (High molecular weight glutenin), 100 Iranian wheat cultivars including imported and domestic genotypes were analyzed using ALP-PCR technique. Four specific primer pairs were used based on the genetic loci of Glu-A1, Glu-B1, and Glu-D1 to perform the chain polymerase reactions. PCR reaction products were resolved on 2% agarose gel. Since allele "a" had the largest relative frequency (0.707), two alleles (a 344bp; b 362bp) were identified by P1-P2 primer for Glu-A1 locus. Three alleles (a 800bp; b 500bp; c 300bp) were detected for Glu-B1 locus by P5-P6 primer, and allele "b" was assumed as the highest relative frequency (0.618). Two primer pairs were applied for Glu-D1 locus. Ultimately, four alleles were identified, where allele "c" had the highest relative frequency (0.525). The observed genetic variation value for Glu-D1 locus (H=0.648) exhibits the maximal polymorphism. Using cluster analysis, the relationship between the observed polymorphism and geographical variation was investigated. The results indicated that there exists a remarkable variation in Glu-A1 locus between the Iranian wheat cultivars.

Key words: Allelic variation; ALP; Genetic distance; Glutenin.

THE CHANGES OF GERMINATION CHARACTERISTICS AND ENZYME ACTIVITY OF BARLEY SEEDS UNDER ACCELERATED AGING

S. A. TABATABAEI

ABSTRACT. Seed aging is the main problem of seed storage. Changes of enzyme activity and reduction of seedling growth are consequence of seed deterioration. An experiment was conducted to evaluate the effects of accelerated aging on germination indexes and enzyme activity of barley seeds. Seeds were incubated in closed plastic boxes for the accelerated aging treatments at 41°C. Three accelerate aging regimes were performed by placing seeds at 41°C and relative humidity (RH) of 90-100 % for 0, 4 and 8 day periods. Our results showed that increasing aging duration resulted higher reduction in germination percentage, germination index, mean time to germination, normal seedling percentage, catalase and ascorbate peroxidase. The highest germination percentage, germination index, normal seedling percentage and enzyme activity were achieved in control conditions (0 day of aging). Under aging conditions, germination percentage, means time to germination, germination index, normal seedling percentage and enzyme activity decrease significantly. Also, our results indicated that seed aging is related to decrease of enzymes and may contribute to low germination efficiency. The general decreases in enzyme activity in the seed lowers the respiratory capacity, which in turn lowers both the energy (ATP) and assimilates supply of the germinating seed, also decrease in antioxidant enzymes is linked to an increased accelerated ageing and decreased germination characteristics. Subsequently, proposed a positive relationship between antioxidant enzyme capacity and the vigour of the seed.

Key words: Germination characteristics; Enzyme activity; Barley seed; Aging.

STUDY OF GERMINATION AND SEEDLING GROWTH OF BLACK CUMIN (*NIGELLA SATIVA* L.) TREATED BY HYDRO AND OSMOPRIMING UNDER SALT STRESS CONDITIONS

A. AHMADIAN, Y. SHIRI, M. FROOZANDEH

ABSTRACT. The objective of the study was to determine the responsible factors for germination and early seedling growth due to salt toxicity or osmotic effect and to optimize the best priming treatment for these stress conditions. To study the effect of osmopriming and hydropriming on germination and seedling growth of black cumin (*Nigella sativa* L.) under salt stress conditions this experiment was conducted at Torbat-Heydariyeh University, Torbat, Iran. The treated seeds (control, hydropriming and $ZnSO_4$) of black cumin were evaluated at germination and seedling growth for tolerance to salt (NaCl and Na_2SO_4) conditions at the same water potentials of 0.0, -0.3, -0.6, -0.9 and -1.2MPa. Electrical conductivity (EC) values of the NaCl solutions were 0.0, 6.5, 12.7, 18.4 and 23.5 dSm-1, respectively. Results showed that hydropriming increased germination and seedling growth under salt stress. Germination delayed in both solutions, having variable germination with different priming treatments. In NaCl treatment, germination percentage, root and shoot weight, shoot and root length were higher but mean germination time and abnormal germination percentage were lower than Na_2SO_4, at the same water potential. The root / shoot weight and R/S length enhanced with increase of osmotic potential in both NaCl and Na_2SO_4 solutions. NaCl had less inhibitor effect on seedling growth than the germination. It was concluded that inhibition of germination at the same water potential of NaCl and Na_2SO_4 resulted from salt toxicity rather than osmotic effect. The findings of this experiment can be useful and applied to achieve best germination and uniform emergence under field conditions for farmers of medicinal plants.

Key words: Black cumin (*Nigella sativa* L.); Salt stress; $ZnSO_4$; Priming; Seedling.

EFFECT OF SOME TREATMENTS ON SEED DORMANCY, GERMINATION AND ANTIOXIDANT ENZYMES OF *KELUSSIA ODORATISSIMA* MOZAFF. SEEDS

A. HASSAN SHAYKHI, B. MAJD NASSIRY, M. ATAEI KACHOUEI

ABSTRACT. Seed dormancy provides a mechanism for plants to delay germination until conditions are optimal for survival of the next generation. Dormancy release is regulated by a combination of environmental and endogenous signals with both synergistic and competing effects. In many cases, viable seeds are called dormant, when they are simply not germinating. *Kelussia odoratissima* Mozaff. (wild celery) is a medicinal plant (kind of umbelliferous) of Iran. Seeds of *K. odoratissima* often germinate poorly in the nursery, because of their seeds have a dormancy. Thus shortening the dormancy and increasing germination with laboratory methods can be effective in restoring the plant. The objective of this research was to evaluate the effect different methods of breaking of dormancy on germination of *Kelussia odoratissima.* Experiments used were stratification (0, 3, 6, 9 and 12 weeks), stratification and gibberellin and stratification and nitrate potassium. Results showed that stratification, stratification and gibberellin and stratification and nitrate potassium increased germination characteristics and catalase and ascorbate peroxidase activity. The highest germination percentage, seedling length, seedling dry weight and catalase and ascorbate peroxidase activity were attained from

stratification and gibberellin 500 ppm and stratification and nitrate potassium 1%. In general, results showed that stratification and gibberellic acid (500 ppm) is the best treatment for breaking of *Kelussia odoratissima* Mozaff. seed dormancy and in seeds antioxidant enzymes could trigger germination.

Key words: Antioxidant enzymes; Breaking of dormancy; Germination; *Kelussia odoratissima*; Dormancy.

EFFICACY OF INSECTICIDES AGAINST CITRUS PSYLLA (*DIAPHORINA CITRI* KUWAYAMA*)* IN FIELD AND LABORATORY CONDITIONS

M. QASIM, D. HUSSIAN

ABSTRACT. The experiments were conducted in a citrus orchard to check the efficacy of insecticides against citrus psylla, and mortality was observed after three days, seven days and then after one month. Four insecticides, Polytrin-C, Talstar, Bifenthrin and Imidacloprid applied, had an almost equal effect on the population reduction of citrus psylla on all citrus plants. The trial was laid out in randomized complete block design (RCBD) having five treatments with three replications in a citrus orchard, after three days of spray showed percentage control as 96.91%, 94.33%, 93.83% and 93.06% of following insecticides Polytrin-C, Imidacloprid, Bifenthrin and Actara, respectively, calculated by Minitab 15. Psylla adults were exposed to different concentrations (500, 400, 300, 200 and 100 ppm) of Imidacloprid and Bifenthrin, and two controlled conditions (with leaves and without leaves). Both Imidacloprid and Bifenthrin insecticides proved to be the most effective against *D. citri* with lethal times (LT_{50}s) of 4 and 5 hours, respectively, at a concentration of 500 ppm, calculated from probability test with Minitab-15.

Key words: Citrus psylla; Percentage control; Imidacloprid; Bifenthrin.

POTENTIAL HONEY BEE PLANTS OF EGYPT

H. F. ABOU-SHAARA

ABSTRACT. There are various plants with potential feeding importance to honey bee, *Apis mellifera*, colonies as source of pollen, nectar or both. Selection of suitable regions for apiaries mainly depends on the availability of honey bee plants in the apiary region. Identifying honey bee plants in specific region is very essential for honey and pollen production from honey bee colonies. Lacking the information about the beneficial plants for honey bees including; plant name, flowering time and potential benefit to honey bee colonies could be considered as a limitation for beekeeping development. So far honey bee plants are not well studied in Egypt. This review paper presents potential honey bee plants in Egypt using the available publications. The studies on honey bee plants in Egypt were also reviewed. This work can be considered as a guide for beekeepers and researchers. Moreover, the presented plants here can

be used in comparing honey bee plants of Egypt with other countries to get a better understanding of honey bee flora. More detailed investigations on honey bee plants are strongly required to be done at all Egyptian Governorates.

Key words: *Apis mellifera*; Pollen; Nectar; Foraging; Honey.

PERFORMANCE ASSESSMENT IN BUSINESS OF AGRICULTURAL COMPANIES USING BALANCED SCORECARD MODEL

S. BREZULEANU, Carmen Olguţa BREZULEANU, I. BRAD, T. IANCU, A. CIANI

ABSTRACT. The performance management is a strategic and integrated approach for long-time success of the activity of agricultural companies, by improving the performance of the organization, teams and individuals. In search of success, the performance management uses a variety of models, techniques and methods, some taken from other systems and improved and others of its own, focusing on strategy and differentiating features that provide a strong competitive advantage. The Balanced Scorecard (BSC) model identifies several dimensions of the organization, representing areas where organizations need to achieve results at department, team or individual level. According to the type of the agricultural company, there can be esential financial aspect, customers, internal processes, knowledge and learning, service quality, market share etc. The company under study, S.C. Agrocomplex Lunca Paşcani S.A., is representative in terms of ownership, farm and profile of the agricultural production in Moldavia region. According to the methodology developed, starting from the strategy of S.C. Agrocomplex Lunca Paşcani S.A. we identified the strategic objectives for each situation and the level of reaching the objectives using several indicators. In the second stage of the BSC analysis, the indicators are defined according to the management priorities of S.C. Agrocomplex Lunca Paşcani S.A. in four categories, corresponding to the four dimensions of the classical model: customer perspective, perspective of processes within the company, employee perspective and financial perspective.

Key words: Agricultural company; Performance management; Balanced Scorecard (BSC) model.

REZUMAT. Estimarea performanţei în afaceri a societăţilor agricole utilizând modelul Balanced Scorecard. Managementul performanţei reprezintă o abordare strategică şi integrată a asigurării succesului de durată în activitatea societăţilor agricole, prin îmbunătăţirea performanţei organizaţiei, echipelor şi indivizilor. În căutarea succesului, managementul performanţei utilizează o diversitate de modele, tehnici şi metode, unele preluate de la alte sisteme şi perfecţionate şi altele proprii, cu accent pe strategie şi pe elemente de diferenţiere puternice care să ofere un avantaj faţă de concurenţă. Modelul Balanced Scorecard (BSC) identifică mai multe dimeniuni ale organizaţiei, reprezentând zone în care organizaţiile trebuie să obţină rezultate la nivelul departamentelor, echipelor sau indivizilor. În funcţie de tipul societăţii agricole, dimensiunile esenţiale pot fi: aspectul financiar, clienţii, procesele interne, cunoştinţele şi învăţarea, calitatea serviciului, cota de piaţă etc. Asociaţia luată în studiu, S.C. Agrocomplex Lunca Paşcani S.A., este reprezentativă în ceea ce priveşte forma de proprietate, de exploataţie şi de profil a producţiei agricole în zona Moldovei. Conform metodologiei elaborate, pornind de la strategia S.C. Agrocomplex Lunca Paşcani S.A., sunt identificate

obiective strategice pentru fiecare situaţie în parte, iar gradul atingerii obiectivelor este măsurat cu ajutorul unor indicatori aleşi. În a doua etapă a analizei Balanced Scorecard, indicatorii sunt delimitaţi în funcţie de priorităţile conducerii S.C. Agrocomplex Lunca Paşcani S.A. în patru categorii, corespunzătoare celor patru dimensiuni ale modelului clasic: perspectiva clienţilor, perspectiva proceselor din întreprindere, perspectiva angajatului şi perspectiva financiară.

Cuvinte cheie: societăţi agricole; managementul performanței, modelul Balanced Scorecard (BSC).