Evaluation of Semi-Distributed SWAT Model to Simulate Streamflow (Case Study in Talar Watershed,Mazandaran Province)

ABBAS GHOLAMI[1][*] , KAKA SHAHEDI[2], MAHMOOD HABIBNEJAD ROSHAN[3], MEHDI VAFAKHAH[4], KARIM SOLAYMANI[5]

1. Faculty member, Shomal University and Ph.D. student in Watershed Management, Agriculture and Natural Resources of Sari University
2. Assistant Professor, Agriculture and Natural Resources of Sari University
3. Professor, Agriculture and Natural Resources of Sari University
4. Associate Professor, Natural Recourses, Faculty of Tarbiat Modarres University
5. Professor, Agriculture and Natural Resources of Sari University

ABSTRACT

In order to evaluate the efficiency as well as effectiveness parameters regarding rainfall-runoff relations , SWAT models were employed in Talar Watershed, Mazandaran province. Through this model, calibration was done as based upon 8 rainfall stations with daily precipitation, 5 evaporation stations of daily temperatures along with output discharge in Shirgah-Talar Hydrometric Station. The Performance and calibration as well as validation of this model, was simulated initially as based upon 21 parameters of high sensitivity. In validation phase of the 21 selected parameters, the study regarding p-value and t-state indices show sensitivity and behavior of parameters .At this stage, CN2-MGT parameter with the least level of p-Value index and the highest index value of t-State are recognized as the most sensitive parameters. The first phase of the model calibration results indicated that weaknesses in the simulation model coefficients of p-factor, r-factor, R2 and NS are respectively 0.04, 3/91, 0/01, -44/15. Due to these issues, through an analysis of the results of the first phase of this study, 8 sensitive parameters were calibrated through the first 21 parameters until attainment of more appropriate correlation between simulated vs. observed discharges. In validation stage of the 8 sensitive parameters within 95% confidence interval, high correlation was attained between simulated vs. observed discharges showing the result as the scatter plots of this phase. A comparison of p-factor, r-factor, R2, N.S with the value of 0.93, 0.93, 0.79, and 0.98 respectively shows a better model simulation that promotes the efficiency of model for simulation at this stage.

Keywords: Sufi2 Program, Sensitive Parameter, calibration, validation.

[*]Corresponding author: Gholami@shomal.ac.ir

Application of Archimedean Copula Functions in Flood Frequency Analysis (Case Study: Dez Basin)

FARSHAD AHMADI[1][*], FEREYDON RADMANEH[2], GHOLAMALI PARHAM[3], RASOUL MIRABBASI NAJAF ABADI[4]

1. Ph.D. Candidate, Water Resources Engineering, Shahid Chamran University, Ahvaz
2. Associate Professor, Water Engineering Department, Shahid Chamran University, Ahvaz
3. Professor, Department of Statistics, Shahid Chamran University, Ahvaz
4. Assistant Professor, Water Engineering Department, Shahre Kord University, Shahre Kord

ABSTRACT

Flood is one of the hydrological phenomena of a complicated nature which causes vast degrees of damage. Throughout the present study, flood frequency analysis [in Dez basin at the junction of two hydrometric stations of Sepid Dasht Sezar (SDS) and Sepid Dasht Zaz (SDZ)] was performed during the period of 1957-2012 employing the copula functions. Along this purpose, the partial duration series of flood at the studied stations were initially extracted employing the Malmoud-Tookart method. Within the next step, 11 different distribution functions were fitted to the extracted flood series, where the Generalized Logistic (SDS station) plus Generalized Extreme Value (SDZ station) distribution functions were selected as the most suitable ones. Following the suitable marginal distributions, some of Archimedean copula functions (Ali- Mikhail– Haq, Frank and Clayton) were employed for joint flood frequency analysis (Dez basin). Results revealed that Frank copula matched the highest with empirical copula for paired flood data of SDS and SDZ stations. For an estimation of the return period of events the joint return periods within two states "AND" and "OR" and also the conditional return period were taken into consideration. Based on the results obtained from joint analysis of flood series in the two river branches, it was found that the severe flood events may occur simultaneously at SDS and SDZ River branches at a sequences of every 70 years.

Keywords: Copula function, Marginal distribution, Partial series, Power law, Stationarity test.

[*]Corresponding author: Farshad.paper@yahoo.com

Qazvin's Irrigation Network Evaluations, Using the External Indicators of Rapid Appraisal Process

AMMAR HABIBI KANDBON[1][*], MARYAM KAYHANI[2], ATEFE PARVARESH RIZI [3] MEHRDAD SHAIKHHOSEINI[4]

1. Graduate Student, Water Structure Engineering, University of Tehran
2. Graduate Student, Water Structure Engineering, University of Tehran
3. Assistant Professor, Irrigation & Reclamation Dept., University of Tehran
4. Expert, Regional Water Dept. of Ghazvin County

ABSTRACT

With Regard to the importance of efficient use of agricultural water, management and distribution of water in irrigation networks are two of the necessary factors to increase water use efficiency. Monitoring and evaluation of water management and distribution methods should be done and evaluated continuously, to evaluate and improve these procedures. Considering this, some standard and effective methods have been developed through international organizations. In this study, water distributions in Qazvin's irrigation network along with its external factors were considered using the Rapid Appraisal Process (RAP). The results indicated that the water resources manipulation in the region is not properly planned and there was no plan to more properly exploit the water resources in the network. Within this period, the responsible institutions distributed only about 28 percent of total available water throughout the year. It happened that this has been the major cause of water losses. It was also found that the temporal water distribution is not properly carried out within the canals' network and at most times of the year the amount of distributed water is either less or more than required for the crop pattern. This indicates that water losses in the network had been due to lack of information, poor infrastructure or used to compensate for a part of conveyance losses. The total surplus of distributed water in the network within the year 2013 was about 56 million cubic meters, equal to 25 percent of total required water for the growth of cultivated crops.

Keyword: Rapid appraisal process, Qazvin's irrigation network, Operation Authorities, External indicators

*Corresponding author: Ammarhabibi@ut.ac.ir

Unsteady Flow in V-Notch Weir Installed at the End of a Storage

FIROUZ GHASEMZADEH[1][*] , SALAH KOUCHAKZADEH[2]

1. Ph.D Candidate, Irrigation and Reclamation Engineering Department, University of Tehran
2. Professor, Irrigation and Reclamation Engineering Department, University of Tehran

ABSTRACT

Sharp-crested weirs are common measuring devices in rivers and in irrigation networks. Their installation and operation are simple yet very practical. The hydraulic performance of sharp-crested weirs and their head-discharge equations in unsteady flow conditions are of great interest, however, very limited related studies are available in the literature. Throughout the present study, the hydraulic performance of 90° V-notch weir, installed at the end of a storage installation, was investigated in unsteady flow conditions and the differences between steady vs unsteady overflow observed and evaluated. The results indicate that the differences between steady and unsteady discharges are significant, the level of difference in the investigated scenarios sometimes arising up 40 percent. Therefore, it can be deduced that the previous head-discharge equations reported are no longer valid.

Keywords: Unsteady flow, Stage-discharge, V-Notch weir, Unsteady head-discharge equation, Storage routing

*Corresponding author : Ghasemzade_frz@ut.ac.ir

Application of Nano Clay Particles for Stabilization of Dispersive Clayey Soils

NADER ABBASI[1][*] , ARASH FARJAD [2]

1. Associate professor, Agricultural Engineering Research Institute, Agricultural Research,
Education and Extension Organization (AREEO), Karaj, Iran
2. Former Graduate Student, Department of Technology and Engineering, Islamic Azad University
of Central Tehran Branch, Tehran, Iran

ABSTRACT

Recently, due to improvements and progresses in nanotechnology, application of Nano particles in different sciences especially geotechnical engineering have been widely attended to. Throughout the present research, the effect of different levels of Nano clay on dispersivity potential of two clayey soils of low vs high plasticity has been studied. To follow the purpose, identification tests were initially implemented on clayey and Nano clay soils and then pinhole tests conducted on the specimens containing different portions of Nano clay particles namely; 0, 0.25, 0.5, 1, 2 and 4 percent by weight for an evaluation of their dispersivity potential. The specimens were cured for different durations of 1, 3 and 7 days. The results indicated that the addition of Nano clay particles could reduce dispersivly potential of clayey soils to a considerable extent. It was also found that the effect of Nano particles on two clayey soils of different elasticities is the same with the plasticity characteristics playing no important role in chemical reactions between Nano clay particles and clay minerals. Furthermore, curing time was found to be noticed as a main factor in stabilization of clayey soils containing Nano particles.

*Corresponding author: Nader_iaeri@yahoo.com

Evaluation of Spatial Distribution of Water and Fertilizer Application under Center Pivot Irrigation System

SHAHRAM ZEBARDAST[1][*] , TEYMOR SOHRABI[2], HAMED EBRAHIMIAN[3]

1. MSc. Student, Department of Irrigation and Reclamation Engineering, University of Tehran
2. Professor, Department of Irrigation and Reclamation Engineering, University of Tehran
3. Professor assistant, Department of Irrigation and Reclamation Engineering, University of Tehran

ABSTRACT

Sprinkler irrigation systems should be so designed and implemented in a way that the success of the system can be determined ascertained. Practical solutions to improve the efficiency of the present irrigation systems and provision of suggestions for the future systems are always in mind. The aim followed in this study was to evaluate the uniformity of water and fertilizer distribution in the field under a unit centerpivot sprinkler irrigation system. The location of the research was the experimental field of Tehran University in Karaj within the years 2015 and 2016. Nitrogen needed by the crop was provided through urea (46%). The centerpivot system to be used to assess the distribution uniformity, and measure the level of water and nitrogen was planned with cans arranged radially. Uniformity coefficient of Heermann and Hein of the cans within the first and second course of measurements were recorded 84% and 91%. Uniformity coefficients of fertilizer distribution during the first and second years of fertigation were respectively 69% and 72%. The result has indicated the uniformity coefficient of fertilizer distribution uniformity as less than that of water distribution uniformity coefficient.

*Corresponding author: Zebardast.shahram@yahoo.com

A Determination of the Effect of Groundwater Depth and Salinity on the Contribution to Water Requirement and Growth of Palm Seedlings while Applying Mulch

PARVANEH TISHEHZAN[1]* , ABD ALI NASERI[2], ALIREZA HASSANOGHLI[3] , MUSA MESGARBASHI[4]

1. Assistant Professor, Irrigation and Drainage Department, Water Science and Engineering College, Shahid Chamran University of Ahwaz, Khuzestan, Iran. 2. Professor, Irrigation and Drainage Department, Water Science Engineering College, Shahid Chamran University of Ahwaz, Khuzestan, Iran.
3. Associate Professor, Agricultural Engineering Research Institute (Agricultural Research, Education and Extension Organization), Karaj
4. Professor, Agricultural College, Shahid Chamran University of Ahwaz, Khuzestan

ABSTRACT

Shallow saline water table accompanied by the reduction of the quality and quantity of freshwater, is an important issues of the soil and water problems in some important plains of the world. On the other hand, groundwater contribution to crop water demand may be helpful. The objectives of followed in this study was to find out some proper model of groundwater contribution to supply parts of water needs of palm seedlings. To follow the goal, experiments were performed in three replicated split-split–plot designs inclusive of 3 levels of groundwater salinity (<4, 8 and 12 dS/m), groundwater depth (60 and 90 cm) and two levels of soil surface cover (mulching with cut leaves of date palm vs non mulch application). The data were analyzed and investigated using software MSTATC (V.2), Excel 2007 and SPSS.19. Results indicated the effect of mulch on groundwater contribution very significant (1%). In fact, in treatments with mulch to preserve moisture in the soil to need less water, underground water contribution was also lower. The effect of groundwater salinity and depth on groundwater contribution was not significant at a level of 5 %. To estimate the contribution of groundwater with regard to all the three factors, 11 mathematical models were established and studied. The most suitable regression while using the 3 factors was multivariate linear regression with $r^2=0.6$ and significance of 0.05. Due to the interaction of salinity and groundwater at levels above 90 percent, the possibility of achieving some more accurate models was investigated, using a new factor that results from a multiplication of these two factors. The cubic model (using new factors), was the most appropriate model for the two cases y with no mulch vs mulch use with $r^2=0.76$ and $r^2=0.94$, respectively.

Keywords: Berhi date palm sucker, Mulch, Regression, Water table.

*Corresponding author: Partishehzan@scu.ac.ir

The Effect of Different Levels of Subsurface Drip Irrigation on Yield and Quality of Two Varieties of Palm Kabkab and Zahedi

NADER SALAMATI[1][*] ,HOSSEIN DEHGHANISANI[2]

1. Assistant Professor, Khuzestan Agriculture and Natural Resources Research and Education Center Scientific Board –Agricultural Research Education, and Extension Organization (AREEO), Ahvaz, Iran
2. Associate Professor, Agricultural Engineering Research Institute (AERI), Agricultural Research Education, and Extension Organization (AREEO), Karaj

ABSTRACT

To investigate the effect of the level of water consumption in subsurface drip irrigation on water use efficiency, performance of dates, yield components, and to determine the most appropriate irrigation treatment in two varieties of palm, a split plot experiment within a randomized complete block design of three replications, for a two year period (2014-2015) was carried out in Behbahan Agricultural Research Station. The main factor was the level of water in subsurface drip irrigation at three levels of 75%, 100% and 125% water requirement, sub-plots being comprised of two Varieties of Kabkab and Zahedi. Within all the quantitative traits, except water use efficiency such traits as berry weight, the core, length, number of berries per cluster, date yield and water use efficiency, water levels, there were significant differences observed among treatments. As 2582.1 cubic meters per hectare consumption of water in the treatment of 75% water requirement in addition to saving water consumption by as much as 28.8 and 45.5 percent compared to 100 and 125% water requirement, the yield of the Treatment Research 6563.6 kg and water use efficiency was calculated as 2.542 kilograms per cubic meter. Two varieties of palm Kabkab and Zahedi also not significantly different in terms of yield and water use efficiency. So that in the hearts 6134.9 kg per hectare yield and water use efficiency was calculated 1.721 kilograms per cubic meter.

Keywords: palm, Qualitative and quantitative yield, different levels of water

*Corresponding author: nadersalamati@yahoo.com

A Study of the Effect of Increasing Ratio of Cultivated to Uncultivated Strip width on Root Zone Salinity Reduction in Dry Drainage

MASUOD SOLTANI[1], ALI RAHIMIKHOOB[2*] ABBAS SOTOODEHNIA[3]

1. PhD candidate , Irrigation and drainage Eng. Department of Irrigation and drainage Engineering, Aburaihan College, University of Tehran, Iran
2. Assistant professor, Department of Irrigation and drainage Engineering, Aburaihan College, University of Tehran, Iran
3.Associate professor, Water Eng. Dept. Imam Khomeini International University. Qazvin, Iran

ABSTRACT

High volumes of drained water together with its low quality are two of the major challenges of subsurface drainage systems' operations and operators. Dry Drainage (DD) can somehow solve these problems with low cost and considerable environmental considerations where irrigation water is much lower than the level to satisfy the extent of the available land. Results of other studies have shown that by DD, we can control salinity at the root zone by leaving half of the area of land. Throughout the present study, ratio of cultivated strip width to uncultivated width was investigated as a major effective parameter on DD efficiency. This study was conducted employing two lysimeters at the research field located at the University of Teharn, Abouraihan College on 2015, by considering two different ratios of cultivated strip to uncultivated strip widths (1:1 and 2:1). Sport grass was employed in cultivated strip as reference crop. Soil texture was Loam and irrigation water salinity 3 dS/m. Irrigation water was produced by mixing of tap water with saline water of Qazvin's Marshland. Results showed that, salt balance in root zone can be maintained by increasing the extent of cultivated strip width. Though ratio of 2:1 will be accepted but one should consider that by increasing this ratio, the level of accumulated salt at uncultivated strip will be increased, therefore better management is needed to remove salt in this condition. Also results of lysimeter readings showed independently that, Dry Drainage is of the ability of transporting salt from cultivated areas to uncultivated ones and after some while, salt concentration will be balanced at the root zone. Soil salinity of cultivated strip did not exceed 6 dS/m at end of test; up to nearly twice the salinity of the irrigation water.

Keywords: Dry Drainage, evaporation strip width, soil salinity, water flow and solute transport

*Corresponding author: akhob@ut.ac.ir

The Combined Effect of Crusting and Surface Cracking on the of the Soil Saturated Hydraulic Conductivity

ZAHRA RAMEZANI[1*], ALIREZA VAEZI[2], MOHAMMAD HOSSIN MOHAMMADI[3], FATEMEH BABAEI[4]

1. Former Graduate Student, Faculty of Agriculture university of Zanjan
2. Associate Professor, Faculty of Agriculture university of Zanjan
3. Associate Professor, Faculty of Agriculture university of Zanjan
4. PhD. Candidate, Faculty of Agriculture university of Zanjan

ABSTRACT

Many soils in arid and semiarid regions bear crusts and cracks that exert great effects on soil hydraulic conductivity. Throughout the present study, to study the changes in the extent of seams, formed crust and the impact of these phenomena a on the saturated hydraulic conductivity of soil will be discussed. Experiments were conducted in three soil textures (clay, loam and sandy clay loam) accompanied four continuing (15, 30, 45, 60 minute) rainfalls and repeated at 8 reps. Based upon the results, sandy clay Loam soil carried the lowest level of saturated hydraulic conductivity (21.02 cm/h). This was diagnosed as the higher crust thickness (3.16 mm) and less crack dense (1.92m/m^2) in sandy clay loam soil than in clay and loam soil. In clay soil, due to higher linear expansion coefficient of the crack the density was highest. This issue caused increased hydraulic conductivity of the soil than the sample before rainfall.

Keywords: Density crack, Thickness crust, Linear expansion coefficient

*Corresponding author: ramezani_zahra@znu.ac.ir

Prediction Some Soil Properties Using VIS-NIR Spectroscopy, Kurdistan Province

SALAH ALDIN KARIMI[1], MASOUD DAVARI[2*], HOSSEIN ALI BAHRAMI[3], EBRAHIM BABAEIAN[4], MOHAMMED TAHER HOSSAINI[5]

1. Graduate Student, Soil Science Department, University of Kurdistan
2. Assistant Professor, Soil Science Department, University of Kurdistan
3. Associate Professor, Soil Science Department, Tarbiat Modares University
4. Postdoc Researcher, Soil Water and Environmental Science Department, University of Arizona
5. Instructor, Soil Science Department, University of Kurdistan

ABSTRACT

The VISible and Near-Infrared (VIS-NIR) spectroscopy are non-destructive, rapid, cost-effective techniques, with minimal sample preparation and no loss or damage to the environment that could be introduced as alternatives to conventional soil analysis methods. The objective followed in this study was to evaluate the capacitance of VIS-NIR spectroscopy to predict some soil properties of Qorveh and Dehgolan plains, Kurdistan Province. To follow the propose, 120 soil samples were collected from the study area. Soil properties were assessed through the prevalent standard laboratory methods. The soils spectral reflectances over 350 to 2500 nm range were evaluated using a handheld spectrometer apparatus. Different pre-processing techniques were applied following recording the spectra. Stepwise Multiple Linear Regression (SMLR) was employed to estimate some soil properties. According to RPD values, statistically precision predictions were obtained for cation exchange capacity (2.02), estimations for clay (1.7), silt (1.59), sand (1.8), geometric mean particle diameter (1.52) as well as geometric particle-size standard deviations (1.66), bulk density (1.53), particle density (1.55), organic carbon (1.74), and calcium carbonate equivalent (1.49) were among the acceptable.

*Corresponding author: m.davari@uok.ac.ir

Evaluation of Accuracy of Global Gridded Precipitation Datasets Over Lake Urmia Basin, Iran

SEYED-MOHAMMAD HOSSEINI-MOGHARI[1], SHAHAB ARAGHINEJAD[2], KUMARS EBRAHIMI[3*]

1. Ph.D. Candidate, Water Resources Engineering, Dept. of Irrigation & Reclamation Engineering, University of Tehran, Karaj
2. Associate Professor, Dept. of Irrigation & Reclamation Engineering, University of Tehran, Karaj
3. Associate Professor, Dept. of Irrigation & Reclamation Engineering, University of Tehran, Karaj

ABSTRACT

The present study was aims at analyzing the accuracy of four global gridded precipitation datasets namely CRU, GPCC, PCDR, DEL over Lake Urmia basin, Iran. Along this line, the data observed in six synoptic stations, namely Urmia, Mahabad, Takab, Tabriz, Maragheh and Saqqez for over a period of 30 years (1984-2013) were taken for analysis. Evaluation was done based on Nash-Sutcliffe Efficiency (NSE), correlation coefficient (CC), Root Mean Square Error (RMSE) as well as Bias. Results at all scales (monthly, seasonal and annual) indicated the proper performance of the GPCC. For example, in annual scale, GPCC, outperformed other databases with NSE, CC and RMSE values of 0.87, 0.94, and 31.12 mm respectively. According to the obtained results, performance of the CRU was acceptable. This dataset performed more appropriately than GPCC as based on Bias. On the other hand the PCDR's and DEL's performances were found unacceptable within all-time scales.

Keywords: Precipitation datasets, CRU, GPCC, PCDR, DEL.

[*]Corresponding Author : ebrahimik@ut.ac.ir

Binary K-Ca Exchange on a Clay Separated from a Soil with Dominate illite (mica) Mineralogy: 2- Determination of Selectivity Coefficients and Thermodynamic parameters and effects on them of K-depletion

MARYAM KHALILI RAD[1], HASAN TOWFIGHI[2*]

1, PhD Candidate, Faculty of Agricultural Engineering and Technology, University of Tehran
2. Associate Professor, Faculty of Agricultural Engineering and Technology, University of Tehran

ABSTRACT

Selectivity coefficients and thermodynamic parameters of K-Ca exchange in a clay separated from a soil with dominant illite (mica) mineralogy were studied at two different ionic strengths (0.3 and 0.002 M). The clay was depleted for periods of 0, 6, 25 and 150 hours. The values of the Kerr (K_{Ker}), the Vanselow (K_V), the Gapon (K_G), the Gaines-Thomas (K_{GT}) and the Davies (K_D) selectivity coefficients were increased with K saturation. In the range of $E_K \leq 0.7$, K_V was smaller than 1, suggesting that the exchangers preferred K^+ over Ca^{2+} in this range, however at high E_K values, Ca^{2+} was preferentially selected. Rothmund-Kornfeld model fitted well to exchange data. β in this equation was smaller than 0.66, demonstrating heterogeneity of exchange sites in the clays. The value of β decreased with K-depletion. Furthermore, β decreased with reduction in ionic strength from 0.3 to 0.002 M, indicating an increase in surface sites heterogeneity. Regular Solution (RS) model was also well fitted to the data. Thermodynamic equilibrium constants (K_{ex}) were smaller than 1 and the standard free energy of the exchange reactions (ΔG°_{ex}) were positive in all clays. The values of K_{ex} in different K-depleted clays were not significantly different, indicating that the depletion-collapse cycle of these illitic clays did not change their selectivity for either K^+ or Ca^{2+}. The decrease in the ionic strength led to the increase in K_{ex} while decrease in ΔG°_{ex}, an indication of reduced tendency of clay for K^+ relative to Ca^{2+}. With increasing E_K, K_{ex} remained relatively constant. f_K increased with E_{Ca} and f_{Ca} decreased. A comparison of f_K and f_{Ca} calculated through thermodynamic method and the regular solution model indicated that the values of f_K in RS model were greater than those of the thermodynamic method.

Keywords: Equilibrium constant, K-Ca exchange, K-depleted Clay, Reaction standard free energy, Selectivity coefficients.

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[*]Corresponding Author : htofighi@ut.ac.ir

Error Function Analysis in Nonlinear Parameter Estimation Method for Kinetic and Quilibrium Sorption Models

FARNAZ KHORMAI[1], ALI MAHDAVI MAZDEH[2][*]

1.Former Graduate , water engineering dept., Imam Khomeini International University, Qazvin, Iran
2.Assistant prof, water engineering dept., Imam Khomeini International University, Qazvin, Iran

ABSTRACT

A robust method is required for parameter estimation in determining the governing model in kinetic and equilibrium sorption modelings. In nonlinear method, parameters are estimated taking into account a trial and error procedure to minimize any error function. In this study the effect of different error functions on estimated parameters of kinetic models (Pseudo First and Second order) as well as equilibrium models (Langmuir and Freundlich) were tried. The most appropriate error function was determined using 239 series of kinetic data together with 129 series of equilibrium data extracted from 100 previous studies. Using various error functions shows a lot of changes in the estimated parameters, so that the greatest changes for parameters are about 100%. Using normalized error method, based on experimental data, the most suitable error functions are respectively Errsq, Hybrd and Mpsd with average normal errors of 3 and 3.4, and 3.6. Ef and Crm methods carry the maximum normalized error as according to the experimental data.

Keywords: Sorption modeling, normalised error, changes percent, nonlinear regression.

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[*] Corresponding author: mahdavi@gmail.com

Isolation and Identification of Cyanobacteria from Kavir National Park Hypersaline Soils

ATEFEH ETEMADI-KHAH[1], AHMAD ALI POURBABAEI[2][*], HOSSEIN ALI ALIKHANI[3], MOSTAFA NOROOZI[4]

1.PhD Candidate, Department of Soil Science, University College of Agriculture and Natural Resources, University of Tehran, Tehran, Iran
2.Associate Professor, Department of Soil Science, University College of Agriculture and Natural Resources, University of Tehran, Tehran, Iran
3.Professor, Department of Soil Science, University College of Agriculture and Natural Resources, University of Tehran, Tehran, Iran
4.Assistant Professor, Department of Biotechnology, Faculty of Biological Sciences, University of Alzahra, Tehran, Iran

ABSTRACT

Cyanobacteria constitute a unique group of photoautotrophic bacteria that some of which, due to their structural characteristics, show a significant tolerance as related to salinity. These organisms play an important role in terrestrial environments, especially in arid and semi-arid regions. Throughout the present study, soil cyanobacteria were isolated from the desert regions of Iran and then isolates resistant to hypersaline conditions identified. Forty soil samples were collected from soils in the Kavir National Park. Samples were separated following their being culture in BG11 and ASN III (3.5, 5, 6 and 7% of NaCl) medias and later, incubated under appropriate conditions of temperature and light. They were then identified through morphological keys and afterwards by means of molecular methods. Out of 40 sampling sites cyanobacteria were isolated from only four hypersaline sites. Twenty-seven morphotypes were identified in medium with no sodium chloride, five strains belonging to two genera grown in the medium of 3.5% sodium chloride. From among the remaining five strains, three grew in 5% while two in 6% sodium chloride solutions. Only *Phormidium autumnale* 61st tolerated 7% sodium chloride, isolated from the site of 87.80 dS/m salinity. The results showed that some isolated cyanobacteria from soils of Kavir National Park can grow in such extreme salinity stress conditions and create a biologically active mass.

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[*] Corresponding author: pourbabaei@ut.ac.ir

The Role of Silicate-Solubilizing Microorganisms on Potassium Release Kinetics from K-bearing Minerals

SANAZ ASHRAFI-SAEIDLOU[1], MIR HASAN RASOULI-SADAGHIANI[2]*

1, PhD Student, Department of Soil Science, Faculty of Agriculture, Urmia University, Urmia
2, Associate Prof., Department of Soil Science, Faculty of Agriculture, Urmia University, Urmia

ABSTRACT

A factorial experiment in a completely randomized design was performed to compare the kinetics of potassium (K) release from feldspar, illite and phlogopite in presence of microbial inoculation. The first factor involved microbial inoculation (bacteria, fungi and control), the second factor was K mineral types (feldspar, illite and phlogopite) and the third factor incubation time (1, 2, 4, 8, 12, 16, 24, 32, 48, and 64 hours). The results revealed that microbial inoculation caused an increase in potassium release and soluble-K (K_{sol}) which in samples inoculated with bacteria and fungi increased by 92.3 and 92.8 percent in comparison with control, respectively. Mineral type showed significant impact on the kinetics of potassium release. Potassium release (from phlogopite) was 1.11 and 1.13 times higher than feldspar and illite, respectively. The maximum reduction of pH and the highest increase of soluble-K, was observed in phlogopite treatment which was inoculated with the fungi. pH in this treatment decreased 2.69 units and K_{sol} increased 7.38 units as compared with control. Among the kinetic models which were fitted, according to R^2 and SEE, kinetics of potassium release was described with Ellovich, power function, first order and parabolic diffusion equations satisfactorily. Among these four equations, the power function equation was detected as the most appropriate model for data fitting. Significantly inverse correlation ($r = -0.83^{**}$) was observed between K_{sol} and pH. Therefore, the presence of silicate solubilizing microorganisms increases the rate of potassium release from K- bearing minerals.

Keywords: Feldspar, Kinetics model, Microbe-mineral interaction, potassium

* Corresponding author: m.rsadaghiani@urmia.ac.ir

A Study of the Performance of Polymer vs Plant Mulch to Reduce Soil Loss in Areas Prone to Wind Erosion in Khuzestan, Iran

MANDANA SHAHNAVAZ[1], ALI GHOLAMI[2]*, MEHDI NOURZADEH HADDAD[3], EBRAHIM PANAHPOOR[4]

1. PhD Candiate,Soil Science ,Islamic Azad University of Ahvaz
2. Assistant Professor, Department of Soil Science ,Collage Islamic Azad University of Ahvaz
3. Assistant Professor, Department Payame Noor University
4. Ph.D. Candiate, Soil Science ,Islamic Azad University of Ahvaz

ABSTRACT

Wind erosion is a problem of recent years that has affected many parts of the world. In Iran, the final result of this phenomenon is fine dust. Due to the harmful effects of petroleum mulch, polymer and plant mulch is particularly important to reduce the environmental impact of these compounds and partly solve the problem of soil loss in the erosion-prone land. Throughout the following study, two types of mulch, namely polymer vs plant mulch as soil stabilizers were used at four levels of: 0, 15%, 30% and 60% on three types of soil taken from wind erosion prone sites in Khuzestan. The effects of mulch to reduce soil loss in the wind tunnel at speeds of 8, 10, 13 m/s were examined. The results of the experiments were analyzed through SPSS software the tests had been through a performed factorial experiment in a randomized complete block design. Statistical analysis showed that the soil treated with both type of mulch, significantly differed from control in reducing soil loss. It also showed that between the two types of mulch (in terms of impact on the reduction of soil loss) there is no significant difference, But the mulches when used in various concentrations are significantly different one from the other at one percent level. Results of polymer and plant mulch (both liquid) showed that the use of polymer mulch could well decrease the soil loss when at speeds of 8, 10 and 13 m/s. Also, mulch plants, reduced the soil loss in the Agricultural soil of Abdolkhan and Hoveyzeh areas. But within the lands of sand Borvayeh area, this mulch had not a positive impact on reducing soil loss in low concentrations that is thought to be due to different soil particle size distribution, organic matter and the type of ions in the soils.

Keywords: Wind erosion, polymer mulch, mulch plants, soil loss

* Corresponding author: agholami@iauahvaz.ac.ir

Determination of the Critical Level of Copper for Corn (Single Cross704) in Some Soils of East Azerbaijan Province

ELHAM ABDOLMALEKI[1], ADEL REYHANITABAR[2][*], NOSRATALLAH NAJAFI[3]

1. Former Graduate, Faculty of Agriculture, University of Tabriz
2. Associate Professor, Faculty of Agriculture, University of Tabriz
3. Associate Professor, Faculty of Agriculture, University of Tabriz

ABSTRACT

Knowledge about the copper (Cu) critical level and corn plant response to application of Cu can effectively help with the proper use of this element. The purpose of this research was the determination the critical level of copper for corn in 21 soils of East Azerbaijan province. In a greenhouse experiment, corn plant (*Zea mays* L.) single cross 704 variety, cultivated in two levels of Cu, zero and 7.5 mg Cu kg^{-1} soil with three replications as a factorial experiment in a randomized complete blokes design. After the 60 days (end of the growth period), before harvesting chlorophyll index of leaf were measured, then plant harvesting and wet and dry weight in shoot and copper content were measured. Critical level of soil Cu for corn with DTPA and AB-DTPA methods were measured by using plant response column order procedure, graphical Cate-Nelson, Cate-Nelson analysis of variance (ANOVA) and Mitscherlich-Bray. According to the results, by application of copper, significant increases in corn shoot dry weight, concentration and content of Cu occurred. Critical level of soil Cu for corn with DTPA method based on 90 % relative yield, was determined as 1.46, 1 and 1.70 (mg Cu kg^{-1} soil) by using plant response column order procedure, graphical Cate-Nelson, Cate-Nelson analysis of variance (ANOVA) and Mitscherlich-Bray, respectively and for AB-DTPA method was 1.50, 1.80 and 2.94 (mg Cu kg^{-1} soil), respectively. The Mitscherlich-Bray equation coefficients C for these methods were 0.5874 and 0.3397 kg soil mg^{-1} Cu, respectively. In this research, the Cate-Nelson analysis of variance method was not the appropriate for determination of critical level of Cu for corn. Drawing the plot by the Excel software and correlation coefficients with statistical analysis by using SPSS software was performed.

Keyword: Corn, Cu critical level, Cate-Nelson and Mitscherlich-Bray.

Corresponding Author Email : areyhani@tabrizu.ac.ir *

Optimization Suspended Load Estimation Models by Using Geo-morphometric Parameters and Attribute Reduction Technique

MARYAM ASADI[1], ALI FATHZADEH[2]*, ROHOLLAH TAGHIZADEH-MEHRJARDI[3]

1. MSc student of watershed management, Faculty of Agriculture and Natural Resources, Ardakan University
2. Assistance Professor, Faculty of Agriculture and Natural Resources, Ardakan University
3. Assistance Professor, Faculty of Agriculture and Natural Resources, Ardakan University

ABSTRACT

Estimation sediment load of rivers is the most important challenges in river engineering. So, it was addressed different models by varying structures to estimate sediment load. In this study, it was reviewed effectiveness of geo-morphometric parameters and data mining technique to predict suspended sediment load in 68 basins in two different regions of Iran. For this reason, it was run six artificial neural networks models, linear regression, K-nearest neighbor, Gaussian process, support vector machine evolutionary on two types of suspended sediment data (i.e. maximum and average sediment). To optimize models, it was used geo-morphometric parameters and river discharge as input data into model and it was used attribute reduction technique to decrease the algorithms space. Results of models evaluation indicated that models performance is difference in average and minimum sediment data, so that the best method to predict average sediment is the Gaussian model by correlation coefficient, 0.988 and root mean squared, 11.004 and the best method to predict minimum sediment is support vector machine evolutionary model by correlation coefficient, 0.966 and root mean squared, 0.171.

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* Corresponding Author: fatzade@ardakan.ac.ir

Evaluation of Sequential (with drain water) and Normal Irrigation on Yield, Yield Criteria and Water Productivity of Corn, Soybean and Sunflower

MOHAMMAD AZIZI[1], MOAHAMMAD ALBAJI[2][*], SAEED BOROOMAND NASAB[3]

1. Former Graduate, irrigation and drainage, Shahid Chamran University of Ahvaz
2. Assistant professor, Irrigation and Drainage Dept. Faculty of Water Sciences Eng.Shahid Chamran Univ, Ahvaz
3. Professor, irrigation and drainage, Shahid Chamran University of Ahvaz

ABSTRACT

In order to evaluate using effluent (as sequential irrigation), a study was conducted at research farm at Shahid Chamran University of Ahvaz during 2014-2015. Regarding to this purpose, a farm (with long 30m and width 24m) was selected and divided into 3 parts (A, B and C). Corn, soybean and sunflower were cultivated in parts A, B and C, respectively and effluent was used for irrigation of next parts. In part B, a split-plot design as randomized complete blocks with two treatments: irrigation type (Karun River and effluent) and urea fertilizer (100%, 75% and 50% application) was applied (with three replicates). Experiment design in part C was similar to part B except at 75% urea fertilizer. ANOVA results for soybean revealed that interaction between irrigation type and urea levels had significant effects on growth yield and biological water productivity (P<0.01) and fresh leaf weight (P<0.05). ANOVA results for sunflower showed that interaction between irrigation type and urea levels had significant effects on 100-seed weight, seed yield and seed water productivity (P<0.05). In general, it was found that sequential irrigation with drain water saved water and increased water productivity as 45.59% and 100%, respectively, compared to normal irrigation.

Keywords: Drainage, Drain, Sequential Cultivation, Urea Fertilizer

* Corresponding Author: m_albaji2000@yahoo.co.uk