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Economic assessment of winter wheat in loess soils with diffuse double layers and '140mm' water consumption

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Abstract:

A randomized complete block design with 7 treatments and 3 replications and Water treatment include, Surface irrigation, sprinkle irrigation and drip. Water treatment basin irrigation intensity of 240 mm / h and sprinkler irrigation intensity of 140 mm / h and drip irrigation intensity of 60 mm / h was done, loess soils with a higher specific surface of 130 m2 / gr was performed. Surface irrigation was the highest yield to calculate the costs and comparison with the treatment of dry-farming economic efficiency was not found. No one treatments was not economic, in case of emergency and the need for irrigation and water resources on the other hand offer.

Keywords: Wheat –Loess soils – Special Surface - Economic - Diffuse Double Layers

Introduction:

Today, water scarcity and high cost of water has led in many cultures there is no economic efficiency. In this design, with 7 treatments and 3 replications in the field of Gorgan University of Agricultural Sciences and Natural Resources was conducted in an area of 1500 square meters. water treatment include, Surface irrigation, sprinkler irrigation and drip, dry farming treatments include without cultivation without irrigation (control of water stored) - black plastic between the rows and rows of clear plastic and rain fed treatment. Irrigation system using the specified output of 6 times during the growing season and 140 ml of water was added to the plots. Data were compared at 5 % with SAS Software.

Illite clay layers may be blocked by drying and this causes limited use of potassium for the plant. With respect to potassium higher quantities for extraction by ammonium acetate and its higher densities (concentrations) within the soils with specific surface area in test site, potassium slow diffusion (exchange of potassium) and the existing synthetic exchange potassium in Diffusion Double Layer (DDL) may hinder plant adequate absorption and lead to reduced yield. Many same works were done by Gorgan agricultural science university students[1], [2], [3] and [4].

Materials and Methods:

This study was conducted in research farmland of Gorgan University of Agriculture Sciences and Natural Resources, which is situated on 54°30´E and 37°45´N.

Field soil has been classified according to American classification (Typic Haploxerept).

By application of ethylene glycol mono ethyl ether, soil specific surface area was measured. The value of specific surface area was measured 132m²/gr for the given soil. (Carter et al, 1986).[5]

The length and width of 6 x 4 plots were divided. All the plots with 200 kg per hectare potassium sulfate and 200 kg per hectare urea (twice) were enrichment. Immediately winter wheat seeds in 15 rows with a distance of 20 cm between rows 20 cm were planted. In order to prevent the infiltration of water between the plot of each plot to another plot of 4 meters was observed. in clear plastic and black plastic strip porous treatments between the rows were set up to absorb the impact of the sun 's heat loss or gain of moisture compared to dry and wet check. Water treatment basin irrigation intensity of 240 mm / h and sprinkler irrigation intensity of 140 mm / h and drip irrigation intensity of 60 mm / h was carried out. a composed sample was prepared from zero depth to 30cm from ground level and it was dried after transfer to air lab where physical and chemical experiments were carried out on them. Irrigation was carried out at three times before clustering on 6th, 13th and 24th March 2008, and at three times after clustering on May 1st , 9th and May 22nd 2009. The quantity of transferred water was 3.3m³ in any plot at each step which is equal to 137mm water. Dropping, rain- water and flooding irrigation systems included water transfer system and the needed equipment for realization of study goals, which were installed and plastic, black and transparent mulches with 20cm width and similar holes (to penetrate rain- water) were inserted within intervals in cultivation rows. By construction of water transfer equipment and water pumps, irrigation treatments were built. By means of fixed round sprinklers, rain water irrigation was designed identically in three plots. Through construction of surface spectra along each row with drippers at 20cm intervals, dropping irrigation was planned and implemented and finally flooding irrigation was done normally by releasing water uniformly over plot surface. To conduct

chemical syntheses, samples were derived from rhizosphere and soil up to 30cm depth and exactly from place of taking plant samples and also of the plant simultaneously on dates April 16th 2009 (before clustering) and June 17th 2009 (at the end of maturing of wheat). About 40 samples were extracted from the plant before clustering phase and of four its upper leaves. To determine wheat yield and its elements, sampling was done on 1 cubic meter of surface of trial plot. The given design was carried out within completely random blocks and data analysis by SAS software and through comparison of mean data according to Fisher's Least Significant Difference (LSD) test at 5% level.

Results and Conclusion:

Table 1 shows the yield and the indices. The highest seed yield and total yield of the basin irrigation. The highest and the lowest yield for the treatment of clear plastic to 3770kg / hr and 2860kg / hr , respectively.

Table 1 : yield and yield indices

Treatment	Compared of average									
	Mean Fertilized Stem in Bush	Mean Spikelet in Bush	Mean Length of Stem	Mean Seed per Cluster	Cluster No in $1m^2$	Grain Weight per Thousand gr	Chaffs Yield Kg/hr	Seed Yield Kg/hr	Biologic Yield Kg/hr	Index %
Drop Irrigation	**4.53^{c}**	**75.40^{a}**	**93.26^{a}**	**30.6^{c}**	**535.5^{c}**	**38.17^{b}**	**4210^{b}**	**3420^{b}**	**7630^{c}**	**44**
Rainwater Irrigation	**4.73^{b}**	**63. 8^{c}**	**87.5^{c}**	**28.90^{d}**	**571.2^{a}**	**37.29^{c}**	**4480^{a}**	**3350^{c}**	**7830^{b}**	**42**
Flood Irrigation	**4.80^{a}**	**66.7^{b}**	**90.1^{b}**	**33.36^{b}**	**557.4^{b}**	**40.52^{a}**	**4550^{a}**	**3770^{a}**	**8320^{a}**	**45**
Black Plastic	**4.40^{d}**	**62.2^{d}**	**85.2^{d}**	**40.01^{a}**	**524.7^{d}**	**31.74^{e}**	**3730^{c}**	**3370^{c}**	**7100^{d}**	**47**
Transparent Plastic	**4.06f**	**59.40^{e}**	**89.7^{b}**	**26.67^{e}**	**454.3^{e}**	**37.41^{c}**	**3440^{d}**	**2860^{d}**	**6300^{e}**	**45**
Dry- Farming Treatment	**4.13^{e}**	**63.80^{c}**	**85.50^{e}**	**32.70^{b}**	**451.1^{e}**	**35.12^{d}**	**3780^{c}**	**3330^{c}**	**7110^{d}**	**46**
LSD	**0.05**	**0.92**	**0.69**	**0.77**	**8.61**	**0.5**	**75.05**	**48.06**	**117.5**	**0.002**

Table 2 The physicochemical Properties

Table-2: Soil Physical- Chemical Properties (depth 0-30cm)												
Soil Texture	Sand	Silt	Clay	Azote Nitrate ppm	Ammonium Azote	Absorbable potassium by tetra phenyl borane sodium (ppm)	Organic Carbon OC%	Total Neutral Materials TNV %	Absorbable potassium by Ammonium Acetate ppm	Absorbable phosphorous ppm	Acidity of Saturated Vase	Electric Conductance Ds/m
Silty clay loam	**10**	**56**	**34**	**13.3**	**0**	**620**	**0.96**	**24**	**350**	**11.2**	**7.3**	**0.65**

Loess soil region, Gorgan University of Agricultural was a silty clay loam soil . According to havlin's works [6], with 13-15mgr/ kilogram soil nitrate in zero surface up to 30cm, there is no need to azotic fertilizer for production of 6 tons per hectare for wheat as well as with 12mgr/ kg phosphorus no need to phosphate fertilizer. It seems the given form for nitrogen belongs to colder regions in Gorgan city and for those areas with Gorgan climatic conditions where synthesis of organic substances is done more quickly it requires using azotic fertilizer and probably in higher quantity. The quantity of absorbable potassium was 350 mgr/ kg with acetate so based on havlin's works [6] there is no need to azotic fertilizer with more than 160 mgr/ kg potassium. However, due to high specific surface and abundant Illite clay in the tested soils, wheat yield will be improved by giving fertilizer to soil. Soil texture within zero surfaces up to 30cm is the area of developing wheat in loamy- silty clay. (Table-2)

Table 3 Consumption water

Table-3: Water Chemical Properties:															
Classification	Residual Sodium Carbonate RSC meq/l	Sodium Ratio Absorption SAR	Hardness ppm	Total Cations meq/l	meq/lit								Acidity	Total Dissolvable Salts TDS.mg/l	Electric Conductance Ds/m
					Na^+	Mg^{++}	Ca^{++}	Total Anions	Cl^-	$SO4^{--}$	$HCO3^-$	$CO3^{--}$			
c2S1	0.5	0.2	280	5.9	0.3	2.4	3.2	6.7	0	0.6	6.1	0	7.5	416	0.65

(Table-3) According to classification of American Soil Salinity Lab (1954), since water EC is greater than 0.25 and lesser than 0.75, so water is classified by medium risk of salinity and because of this fact that RSC quantity is lesser than 1.25 and sodium absorption ration is lower than 7 then risk of soil basification with this water and reaction of both with sodium is low. Then the consumption water was no salty no salinity.

Table 4 Comparison of costs

treatment		Seed income) In thousands (		Residual income) In thousands (	Costs) In thousands of rials (							The difference between income and expenses	Treatment difference of treatment dry-farming
	Seed Yield Kg/hr	Seed Kg **10,000** rials	Chaffs Yield Kg/hr	**Straw Kg 500** rials	Land clearing1000	Ground rent	Water pricing 1500	Seed buying 100	fertilizer 200	Working 6000	Equipment		
Drop Irrigation	3420	34200	4210	**210/5**	1000	–	1500	100	200	6000	20000	5610	-20579
Rainwater Irrigation	3350	33500	4480	224	1000	–	1500	100	200	6000	10000	14924	-11265
Flood Irrigation	3770	37700	4550	227/5	1000	–	1500	100	200	6000	5000	24124	-2065
Black Plastic	3370	33700	3730	186/5	1000	–	–	100	200	6000	2000	24586	-1603
Transparent Plastic	2860	28600	3440	172	1000	–	–	100	200	6000	2000	19472	-6717
Dry- Farming Treatment	3330	33300	3780	189	1000	–	–	100	200	6000	–	26189	0

Conclusion:

Increasing moisture of soil solution by irrigation through reduction of soil mechanical resistance and rising growth in root also may provide more absorption of potassium with higher yield. By irrigation treatments, number of clusters was increased in area unit and yield. Compare the costs for treatments and proceeds from the sale of seeds and wheat straw showed when considering the costs and income per hectare for each treatment compared to the dry-farming treatment, No one treatments was not economic, in case of emergency and the need for irrigation and water resources on the other hand offer.

References:

[1] Amini, S., (2006). "Review of waste materials of paper-making factory on soil productivity and wheat growth", MA Thesis, Gorgan University of Agriculture Sciences & Natural Resources.

[2] Sebti, M., Movahedi Naeinee, S.A.R., Ghorbani Nasrabadi, R., Roshani, GH. A., Shahriari, GH. and M., Movahed (2009). "To determine potassium appropriate alembic in a loessal soil with dominantly Illite clay and impact of azotobacter and vermin compost on absorbable potassium density and quantity and yield of dry- farming wheat ",

Journal of herbal production studies, 16th year, fourth Vol.

[3] Talebizadeh, A., (2009). "Review on application of phosphorus fertilizers with calcium, aluminum and potassium- bases and their impact on potassium absorption by dry- farmed winter wheat crop". MA Dissertation, Gorgan University of Agriculture Sciences & Natural Resources.

[4] Faeznia, F., (2004). "Study on impact of compost of mulch organic materials and mixture with soil, zeolite and likasite on soil productivity and wheat growth", MA Dissertation, Gorgan University of Agriculture Sciences & Natural Resources.

[5] Carter et al , 1986.The Technical Paper of soil specific surface

[6] Havlin, J.L.,Beaton, J.D., Tisdale, S.L. (2005). Soil Fertility and Fertilizers: An introduction to nutrient management. Prentice Hall. USA.