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ORIGINAL ARTICLE

EFFECT OF IRRIGATION WITH WASTEWATER SANDBLAST ON VEGETATIVE AND REPRODUCTIVE GROWTH EVERGREENS, SEASONAL FLOWERS CALENDULA SHIRVAN CITY

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ABSTRACT: In order determine the effect of sandblast waste in the growth of calendula seasonal flower were performed pot experiment in a completely randomize design with three replications and five treatments. Treatments include various mixing ratio of water and sandblast as following: T_1=100% sandblast water, T_2=75% sandblast water + 25% sandblast waste, T_3= sandblast water+50% +50%sandblast waste, T_4=25% sandblast water+ 75% sandblast waste, T_5= 100% sandblast waste. Parameters for measuring were plant height, number of leaves and flowers, the first day of flowering, chlorophyll and soil EC levels in both vegetative and reproductive growth stages. The result indicated that the significant relationship exists between of sandblast waste and five treatments in stages of reproduce and vegetative. In overall, irrigated plants with 100% sandblast waste due to food had the highest growth rate in comparison with other factors and generally, using sandblast had positive and significant with calendula plants' growth waste.

KEYWORDS: Irrigation, Sandblast Waste, Calendula, Seasonal Flowers, Treatments.

INTRODUCTION

Sandblast waste have effective role in enrichment of soil and water storage for agriculture with fed of aquifer as well as surface and subsurface. Experts agree that performance and development of watershed plans is important for control of surface waters and sandblast waste and prevention from flow of factories effluent that not only we will not have very large damage. However, it provides basic evolution in control and water storage. In new, human can manage control and guidance water with developing science and technology, although that it perhaps be far from mind but can rescue society from many danger.

Esteki, (2003) believed in cities, industrial life and accumulation of people make life boring and polluted environment. Urban green space cannot partly help the problems of this phenomenon in community health and environmental beautification. Not only good planting frees and plating flowers of street remove monotony of streets and building but also increase freshness. Of environment and make citizen mental peace. Today proved that costs would be to create a green space, in addition to reducing socials crime it can be justified economically. In addition to planting trees of streets and squares should be done according to requirements of city and the mentality of the people (khoshkhoi *et al.,* 2004).

LITERATURE REVIEW

Shabanyan Brojeni *et al.,* (2005) expressed that the effect of effluent and sewage sludge of Iran polydactyl factory on some morphological characteristics and concentration of elements on grass, sweet William, snapdragon have increased with using sewage sludge. Nazari *et al.,* (2006) expressed that they did the effects of effluent and sandblast waste sludge of industrial on soil and growth of agricultural plants (wheat, barley and maize) and ornamental (grass, geranium, begonia, Atlas, calendula, parsley) that is ,indicators of performance have increased with using of sewage sludge and effluent. Rahimi *et al.,* (2009) expressed that the effect of irrigation with effluent on growth of box tree, orange and new leaf have increased their performance and growth. Soroush *et al.,* (2008) showed differential amounts of refinery effluent on absorb of element by Japanese grass figures that effluent provide needed nutrients as a source of irrigation water and absorb of nitrogen, phosphorus and potassium put under effect of effluent treatments.

MATERIALS AND METHODS

This study performed for effect of irrigation with sandblast waste on the growth of calendula, seasonal flowers grown in green house of municipality green space for four month in 1391 in Shirvan city. Pot experiment administered in a randomized block design with three replications and five treatments. Treatments in study were irrigation with sandblast waste that applied on

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calendula. Water of irrigation containing different proportion of sandblast waste and well water is as followers:

T_1: Irrigation with well water (100%)

T_2: Irrigation with 75% well water +25% sandblast waste

T_3: Irrigation with 50% well water +50% sandblast waste

T_4: Irrigation with 25% well water +75% sandblast waste

T_2: Irrigation with sandblast waste (100%)

Soil in post was per liter + sand. First, were pated few smile stone in the end of pots and then pots filled with per liter and sand. Water in need for experiment was sandblast waste and sandblast well water of factory sandblast waste.

Seedling in use prepared from green house of Shirvan municipality and was planted two seedlings of the same size and the sam diagonal and the pots were irrigated with common water to adapt to new conditions for ten days. The experiment began in mid-December and irrigation took place during need of plant. With using of irrigation, moisture of pots soil Maintained at field capacity. Irrigation was done in the evening, and was used 5 liters container for measurement of irrigation water and the mixing ratio was calculated. During the experiment, weeds were removed by hand in the pots and one turn spraying was done with diazinon to control insects of green house. First, factors of measured record manually and then enter in Excel software. Factors measured in stages in the growth and flowering time, analyzed in two stages and survey its results.

The measured parameters included plant height, leaf number, and flower number, date of first flowering, chlorophyll level, and soil EC. In the vegetative stage, measured plant height, number of leaf, chlorophyll level and at flowering time, measured, plant height, number of leaf and flower, first day of flowering, chlorophyll level and soil EC, too. Measurements were done from mid-January to mid may for every 20 days.

As it was measure in 6 series that it was 3 times in the vegetative stage and 3 times in the flowering time. Measurements of factors of number of leaf, number of flowers bloom and first day flowering was eely. Plant height measured from the tip of leaf to surface of pot centimeter. That is, a white leaf put on the surface of pot and was measured height with ruler. We use from chlorophyll meter for measuring of chlorophyll level. That is, every plant distribute to 3 parts and from every part record 3 numbers and was consider total of this g number as plant chlorophyll level.

For determining of soil EC, first, were removed flower plants from in the pot. Then mix perlite and sand and then it weight with scale and separate one 50-gram sample for every pot and was put in disposable containers. 45 soil samples were transported to the laboratory. The samples were saturated with distilled and had been abandoned for 24 hours. Later using the funnel and filter paper take their extract device of EC meter measured soil EC. Of post soil EC measured in two stage, that is before and after experiment. Soil EC measured in the morning and its unit is ds/cm. After the collect date, used MSTAT-C software for computing statistical and respectively comparison of means did by Duncan′s multiple range test at 5% and 1 % level. For draw of the graphs was used Excel software.

RESULTS AND DISCUSSION

The effect of mixing ratio of water and sandblast waste is effective on flowering time and height of plant, number of leaf and flower, first day of flowering, amount of chlorophyll is significant at 1% level, and amount of soil is significant at 5% level. The maximum plant height is 21 cm. Observed at treatment 0 % sandblast water and its lowest (15 cm) observed at 25% sandblast waste. Greater number of leaves (39) and lowest its (28) observed at treatments of 100% sandblast and 0 % sandblast waste respectively. Highest number of flower (12) and lowest its (2) observed at treatments. Of 100% sand blast, waste and 25% sandblast waste respectively. Earliest flowering (36) observed at treatment of 75% sandblast. Maximum chlorophyll (40 Am) and lowest chlorophyll (31) provided at treatment of 100% sandblast waste and 0% sandblast waste respectively. The maximum amount of soil EC (8 and 4 ds /cm) and the lowest its (1 and 4 ds/ cm) observed at treatment of 100% sandblast waste and 50% effluent respectively.

Table 1: The results of analysis variance of calendula irrigation with sandblast waste at vegetative stage

Resource	Attributes mean square			class
variation	Chlorophyll content (SPAD)	Number of leaf	Height(cm)	Freedom
Treatment (amount of waste water)	39.8*	110.14**	3.400**	4
Experimental error	5.52	6.79	0.261	10
Coefficient of variation (CV %)	36.18*	21.18**	6.78**	

*And** significant is at 5% and 1% level respectively

Tables 2: comparison of mean the effect of mixing ratio of water and sandblast waste on flower calendula in the vegetative stage

rate of seasonal flower	Chlorophyll	Number of leaf	Height (cm)	Treatment of waste water
	36B	16B	5C	0%
	37 B	21 A	7.5 B	25%
Calendula (evergreen)	40.5 A	25 A	7 B	50%
	42 A	26 A	5.5 C	75%
	43.5 A	31 A	9 A	100%

Table 3: the result of variance analytic of irrigation calendula with sandblast waste at flowering time

Mean of distribute square					class		Resource
Level of soil EC (dc/cm)	Chlorophyll (SPAD)	First day of flowering	Number of flower	Number of leaf	height	freedom	
0,326**	8.574*	161*	36*	156**	16.851**	4	treatment experiment error
0,108	0.585	5.36	1.2	5.2	0.517	10	
11,41	1.95	11.66	20.1	7.09	4.68		Coefficient of variation

Table 4: comparison of mean of different ratios water and sandblast waste on calendula at flowering time

Sort of seasonal flower	Soil EC (ds/cm)	Chlorophyll content (SPAD)	First day of blooming	Number of bloom	Number of leaf	Height (cm)	Treatment (waste water)
	4.1D	31D	39B	3D	28D	21A	0%
	4.5 C	34C	37C	2D	31C	15D	25%
Calendula	4.6 B	36C	41A	5C	33C	17C	50%
	4.6 B	39B	36C	7B	20A	20A	75%
	4.8 A	40A	37B	12A	18B	18B	100%

Regard to results of this experiment, use of sand washing waste on measurement parameters has effective at flowering time and vegetative stage and it is significant at 50% and 1% level as with increasing of present waste have increased level of growth, this was true in many parameters (Tables 1,2,3 and 4).

The results of study's Erfani, (1999); Erfani *et al.,* (2001) and Shend, (1988) show efficiency of better of better of refined waste to chemical fertilizer for absorb of elements in needing. Study of Asno, (1994) has shown that high levels of nitrogen in effluent will increase yield. In general, the use of wastewater in irrigation can be a rich source of nutrients of plant (Alizadeh, 1996; Matin, 1993). High concentration of nutritional elements nitrogen, phosphorus, potassium, calcium and magnesium in sand blast waste is due to entering of rainwater along with desirable soil erosion.

4.1. The effect of treatments on number of leaf

The sand washing effluent in irrigation water significantly affected the number of leaf at flowering time and growth stage at level of 1%. (Tables 1, 2, 3 and 4) in growth stage, the maximum number of leaf calendula (31) has increased the number of leaf with 100% sandblast waste, however. This effect was significant (Tables 1, 2,3 and 4). In flowering time, the maximum of number of leaf in calendula (39) observed with 100% sandblast waste (Tables 1, 2, 3, and 4). Sandblast wastes sue to different nutrient increase yield. Increasing of the number of leaf increase photosynthesis and finely, increase yield. Rahimi, (2011) showed that the effect of irrigation with effluent on growth mint and orange box tree and new leaf was increased the number of leaf at orange box tree. Soleimani *et al.,* (2006) investigated the effects of effluent on physiological factors on growth of corn that he conclude irrigation with effluent in comparison with common water have special effect on production of leaf surface, total dry weight and speed of growth.

4.2. The effect of treatments on the number of flower

The effect of mixing ratio of water and sandblast waste is significant at 1% level on the number of flower in the calendula that highest number of calendula (12) provided with 100% sandblast waste. Shabanyan Brojeni *et al.,* (2005) studied the effect of effluent and sludge of Iran polydactyl factory on some morphological characteristics and concentration of elements at grass, sweet William, and snapdragon that the effect of treatments of effluent and sludge has increase with increasing of surface of sludge at snapdragon plant. So, 100 tons of sludge sandblast waste of per hectare about 50% added on the number of branch snapdragon to the control. The number of floret at snapdragon inflorescence increased from 13 floret at treatment of control to about 16 and 1g florets at treatments respectively 100 and 50-ton sludge per hectare of effluent. Increasing of number of floret could be due to characteristics of effluent fertilizer special at treatment 50-tone sludge per hectare. Nazari *et al.,* (2002) showed the effect of effluent and sludge of industrial waste on soil and growth of agriculture plants (wheat, barley, maze) and ornamental (grass, geranium,

begonia, Atlas, calendula, and parsley) that the number of flower at treatment water + sludge well was higher than other treatments. The effect of treatments on first day of flowering effect of ratios of mixing and sandblast waste had significant on first of day flowering at calendula with a probability of 1% that earliest flowering at calendula (36 days) provided with 75% sandblast waste. In research that Nazari *et al.,* (2002) investigated the effects of effluent and sludge of industrial waste on soil and agricultural plant growth (wheat, barely, maize) and ornamental (grass, geranium, begonia, Atlas, calendula and parsley). Time of flowering at treatment of well water + sludge was earlier than other treatment. Erfan, (1999) found that effect of irrigation with effluent on performance and quality of lettuce and some characteristics of soil with regard to planting spring of lettuce and warmth of air, plants earlier flower at treatment of effluent and treatment of irrigation with well water + manure. Jenkis *et al.,* (1994) found that performance sorghum, forage and vegetables of irrigation with effluent was high than the products of well water of depth.

4.3. The effect of treatment on chlorophyll

The effect of mixing water and sandblast waste is significant on chlorophyll content at growth stage at probability level 1% that highest chlorophyll content provided at growth stage of calendula (40) with 100% sandblast waste (Tables 1,2,3,4). At time of flowering obtained maximum chlorophyll content of calendula (40) with 100% sandblast waste. Maximum of chlorophyll content coulb be due to presence magnesium in waste; because magnesium make central core of chlorophyll. Rahimi, (2011) stated that effect of irrigation with wastewater make increasing of chlorophyll content at orange box tree with treatment of 100% sandblast waste.

Shabanyan Brojeni *et al.,* (2005) showed effect wastewater and sludge of Iran polydactyl factory wastewater on some characteristics of morphologic and concentration of element at grass, snapdragon, and sweet William that at sweet William is significant increasing of concentration chlorophyll only at treatment of 50-tone sludge per hectare than treatment of control. Reason of this increase is due to high concentration of magnesium at wastewater sludge.

the effects of different ratios of miming water and sandblast waste is significant on content of soil EC of calendula at probability level 1% that obtained the highest soil EC in post of calendula (8 and ds/cm) with 100% sandblast waste (Tables 1,2). It is obvious that increasing of soil electrical conductivity itself is a limiting factor and that must be considered while using of wastewater. According to Nazari *et al.,* (2002) that they observed effect of wastewater and industrial waste water sludge on soil and agriculture plants (wheat, barley, maize) and ornamental (grass, geranium, begonia, Atlas, calendula and parsley) that soil EC refined at treatment of waste water and exit waste water had high content toward river. Fox and Ferguson, (2004) stated effect of irrigation with waste water with drip method on green place plants such as geranium, cypress, petunia that soil EC have increased. Abedikopaei *et al.,* (2003) investigated effect of irrigation of rain and surface with refined wastewater on salinity soil.

CONCLUSION

In general, comparison of indicators of calendula plants' growth showed that treatment by using sandblast had positive and significant with calendula plants' growth waste. Using of sandblast waste due to nutrients such as Nitrogen, Phosphorus and etc. can increase growth of agriculture plants. Regard to results of this experiment and similar experiment can advise that sandblast waste can replace for irrigation of flowers and green place. Since, it provides water of irrigation and saving water also sandblast water can use fresh green place without concerning of destructive effect on society health. Use of sandblast waste should be study and control characteristics of soil to prevent adverse effect on fertility of soil. We can do this test on other flowers and ornamental shrubs in green places. Furthermore, exception factors of investigated at this test; we can use other factors and investigate their impact on growth and time of flowering. Some other factors can be mentioned such as ratios of mixing water and sandblast waste and effect on growth and time of flowering. This study investigated the effect of sandblast washing waste and it can be used in other test like effects of sandblast washing waste on amount of agriculture plant elements.

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