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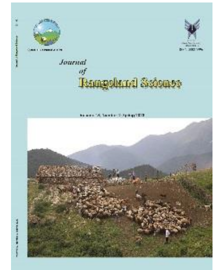

Research and Full Length Article:

Effects of Organic Mulches on Soil Properties and Growth Attributes of Caper (*Capparis spinosa* L.) for Cultivation in the Coastal Rangelands of Southern Iran

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Abstract. Caper is a drought tolerant plant and natural feed of animal in the coastal rangelands of Iran. However, due to soil salinity and alkalinity issues, the growth of such native plants in the southern soils of Iran is limited. This study was conducted to evaluate the effect of various mulches including oil mulch, cement, sugarcane bagasse, palm waste and their combination, on soil properties and plant growth characteristics of caper plant in 2019 in Deylam, Iran. The results showed that using sugarcane bagasse and palm waste mulch significantly increased the soil nutrients (available nitrogen, phosphorus and potassium). Similarly, both mulches significantly increased soil moisture with values of 24.61 and 23.03% and decreased electrical conductivity (EC) with values of 83.60 and 81.46 dS/m, and pH (6.77 and 6.95), respectively ($p <0.01$). In contrast, application of non-organic mulches such as oil and cement mulch and their combination let to decreases of soil moisture with values of 17.03%, 18.40% and 18.97%, respectively ($p <0.01$). Using sugarcane bagasse mulch and palm compost mulch significantly increased stem length (20.26 and 22.43 cm), weight of the aerial part of plant and SPAD value (41.40 and 41.97 unit) of caper plant, respectively ($p <0.01$). There was negative correlation between plant weight and soil EC (R=-0.74) and pH (R=-0.57). Findings suggested the significant effect of organic mulches on adjusting soil EC and pH for improving the establishment of caper plants in the coastal rangelands of Iran.

Key words: Sugarcane bagasse, Palm compost, Salinity, Alkalinity, Coastal rangelands

Introduction

Soil salinity and alkalinity are the most challenging issues affecting soil biota and properties (Shilev, 2020). Caper (*Capparis spinosa* L.) is an ecologically important perennial shrub (Ahmadi and Saeidi, 2018). The plant has a potential source of valuable nutrients such as vitamins (especially vitamin C), digestible protein, carbohydrates and essential minerals valued for human food and livestock feed (Anwar *et al.*, 2016). This plant is also potentially important in combating desertification which has been recommended by experts in the arid and semi-arid regions (Ashraf *et al.*, 2018; Hasanpori *et al.*, 2020).

Iran is located on the dry belt of the world, with 64.5% of its area being affected by the dry climate receiving annual rainfall less than 250 mm (Sanjerehei and Rundel, 2017). In the southern regions of the country, lands are especially more exposed to wind erosion due to soil disturbance, and hot and dry climate (Gholami Tabasi *et al.*, 2014; Morshedi Nodej and Rezazadeh, 2018). The point of concern in the area is that wind erosion increases sand percent, Electrical Conductivity (EC) and soli acidity (pH) whereas the percentage of soil clay, organic compounds, and moisture will be declined (Cho *et al.*, 2006; Morshedi Nodej and Rezazadeh, 2018). In recent years, these factors have limited the growth and yield of native plant including capers in the region (Morshedi Nodej and Rezazadeh, 2018).

One of the sustainable and the most effective methods for soil improvement is mulching and using vegetation cover. Mulches have been widely used in agriculture because of their useful effects on the soil properties and plant growth (Alharbi, 2015). Mulching protects the soil from wind and water erosion, as well as suppressing fugitive dust from soil and controlling runoff dynamics, improving moisture retention capacity, releasing different nutrients, and enhancing biological activities to improve plant growth and establishment (Salau *et al.*, 1992; Mulumba *et al.*, 2008; Qu *et al.*, 2019). It is necessary to select the effective mulches to have the appropriate establishment and regeneration of plants that are adapted to the ecological characteristics of the landscape (Gholami Tabasi *et al.*, 2014). In the past half-century, petroleum mulching practices have been employed to stabilize sand dunes in Iran because of the abundance of oil and gas resources in the region (Khalili Moghadam *et al.*, 2016; Azoogh and Jafari, 2018). However, in recent years, the use of oil mulches has been challenged due to the possibility of releasing water-repellent heavy metals, increasing salinity and soil temperature (Azoogh and Jafari, 2018). Organic mulches- those derived from natural substances like plants and animal materials- are most recommended because of their effects on soil fertility, adjusting EC and pH, and also more benefits for the environment (Teame *et al.*, 2017; Qu *et al.*, 2019). The sugarcane is cultivated more than 130,000 ha in Khuzestan province, Iran (Khalili Moghadam *et al.*, 2016). In addition, date palm is one of the major fruit trees in the southern part of Iran (Shabani *et al.*, 2014). The large amounts of sugarcane and palm wastes produced in every crop season constitute a big charge for the farmers and factories that always try to burn or transport them outside of oasis. Therefore, composting and mulching could provide an economical and eco-friendly significant method to reduce wastes (Nourani *et al.*, 2013; Benabderrahim *et al.*, 2018). This is while the sugarcane bagasse mulch tended to mitigate temperature extremes by serving as a soil insulator (Charles *et al.*, 2017). In addition, Benabderrahim *et al.* (2018) mentioned that palm compost at moderate dose (30 t ha^{-1}) could be highly beneficial for alfalfa plant yield.

So, the aim of the present study was to compare the effects of various organic and inorganic mulches on soil and growth characteristics of Caper plant to improve its growth and establishment in the southern regions of Iran.

Material and Methods

Site description

The present experiment was performed at Deylam city, North of Bushehr province, Iran (30° 3.252 N 50° 9.54 E; altitude 10.0 m). The geographical location of Deylam city in Iran is presented in Fig. 1. This region has a typical hot and humid climate with average annual temperature and rainfall of 25.4˚C and 224.60 mm, respectively (Asghari and Vafaei, 2015). Based on the soil analysis (Table 1), the soil is characterized as sandy, alkaline (pH≤8.5) and strongly saline.

The present study was conducted in the two different sections: a) field experiment and b) greenhouse experiment.

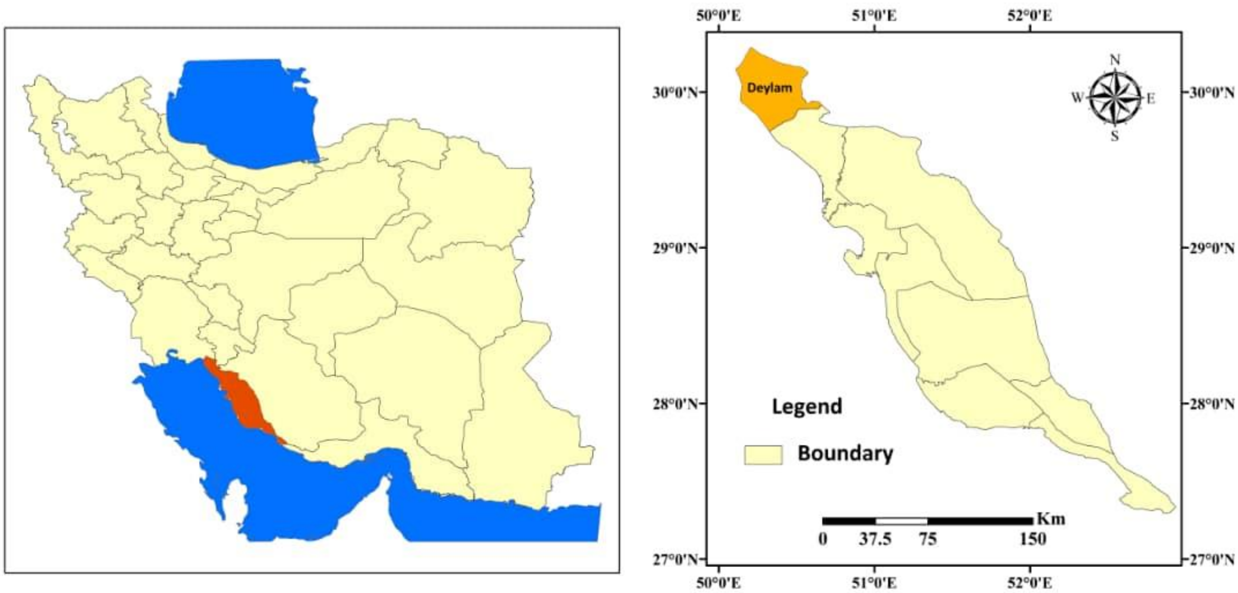

Fig. 1. The geographical location of Deylam city (30° 3.252 N 50° 9.54 E; altitude 10.0 m) in Iran

Table 1. Physicochemical properties of the soil of the tested area, including two depths (0-30 and 30-60) in 2019

Soil Depth	K ppm	P ppm	N (%)	TNV (%)	OC (%)	Saturated (%)moisture	pH	EC dS/m	BD g/cm^3	Clay (%)	Silt (%)	Sand (%)
0-30cm	1274	0.00	0.14	40.00	1.36	64.00	7.13	88.3	1.65	7.00	44.40	48.60
30-60cm	812	2.10	0.07	50.00	0.66	97.00	7.36	79.3	1.74	9.00	36.60	54.40

Field experiment

In a field experiment, the effect of various organic and non-organic mulches on soil properties was investigated. Mulches treatments included:

M0, No mulch (control)

M1, Soil mulch, (usual type of petroleum mulch, at a rate of 10 tones ha^{-1}, equivalent to a thickness of approximately one millimeter per unit area)

M2, Cement-slag mulch (a mixture of Portland cement, pumice sand, and lime was used in a ratio of 400-800-10 g)

M3, Sugarcane bagasse, a mixture of bagasse (sugarcane pulp) and sugarcane cake filter which is the residue that is eliminated during the cane juice decantation process, 40 to 60 ratio- 40% cake filter and 60% sugar cane bagasse)

M4, Palm waste compost (date scraps which are naturally prepared from worn and cut down palm trees as well as date scraps including fruits and kernels of unripe or dried dates that are unusable for humans and livestock)

M5 (Oil-cement mulch), 50% oil mulch+50% cement-slag mulch

M6 (Oil-sugarcane mulch) 50% oil mulch+50% sugarcane bagasse

M7 (Oil-palm mulch) 50% oil mulch+50% palm waste compost

M8 (Cement- sugarcane mulch) 50% cement-slag mulch+50% sugarcane bagasse

Sugarcane bagasse, palm waste compost, and their combination at a rate of 40 tones ha^{-1} were distributed on the plots and were mixed with soil manually to a depth of 30 cm.

Organic mulches are derived from natural materials that decompose over time. 18-month period was considered to give the mulches an opportunity to decompose according to the literature and the nature of the mulches used (Dietrich *et al.*, 2019). After 18 months of implementation of treatments in the field, soil sampling was done and parameters including EC, pH, available nitrogen, phosphorus, and potassium, and also moisture (%) were measured. Total nitrogen by Kjeldahl method, available phosphorus by Olsen method, available potassium by flame photometer method and organic carbon by sulfuric acid using the Walkley-Black method were measured (Rahimi Jahangirlou *et al.*, 2021). Soil acidity was measured electrometrically with the pH meter and EC was measured using the EC meter at laboratory temperature. After measuring parameters, soil sampling was performed from each experimental treatment to a depth of 60 cm and samples were immediately transferred to the laboratory for use in the greenhouse experiments (Pennock *et al.*, 2008).

Greenhouse experiment

In a greenhouse experiment, the effect of soil containing mulches on the characteristics of caper plants was investigated. For this purpose, first, the seeds of caper plant were gathered from Bushehr province in Iran and it is characterized as 98% purity and 9.2 g 1000 seeds weight. For eliminating seed dormancy before planting because of mucilage in the seed coat, the prepared seeds were placed in Gibberellic Acid solution at 500 and 1000 ppm for 12 hours (Tafti *et al.*, 2012). In order to germinate seeds and improve their establishment in pots, 40 seeds were placed in petri dishes consisting of filter paper and then kept in an incubator at 25°C (Taghvaei *et al.*, 2015) for 14 days. To prevent drying, the filter papers were moisturized daily and distilled water was added if necessary. According to the literature, to ensure for germination, the roots have to be 2 mm or more in size (Tafti *et al.*, 2012). Then, three germinated seeds (seedlings) were transferred to pots containing soil and mulch at a depth of 5 cm in three replications.

The pots were kept in a greenhouse with temperature set at 28±4.5°C and day length of 10-12 h for 10 weeks. Sensitivity to day length has not been reported for caper plant in various sources, but in general, day length less than 16 hours is suitable for this plant (Carra *et al.*, 2012). Irrigation was done twice a week and 0.5 liters per pot each time. A set of characteristics were measured which included days to germination, number of leaves, root length, fresh and dry weight of root and aboveground biomass, and SPAD value of meddle leaves. A Minolta SPAD-502 chlorophyll meter (Minolta Camera 163 Co., Ltd, Japan) was used for the estimation of chlorophyll content of the leaves.

Statistical analysis

Results of soil properties in the field and plant growth traits in greenhouse experiments were analyzed using the Completely Randomized Block Design (CRBD) with SAS, v.9.4 software. LSD's statistic was used to test differences ($p \leq 0.05$) among means of both field and greenhouse data. Correlations were derived using Minitab, v.19.

Results and Discussion

Effects of Organic Mulches on Soil Properties

Results indicated that there was a significant effect of much on soil EC ($p<0.001$) and pH ($p<0.01$) (Table 2). The soil salinity increased using oil much (92.48 ds/m) and oil-cement much (90.25 ds/m) to the maximum value whereas using sugarcane bagasse mulch, EC values (83.60 ds/m) and palm waste compost (81.46 ds/m) decreased to the minimum value (Table 2). In addition, using sugarcane bagasse mulch and palm waste compost, the soli acidity decreased to minimum values of 6.77 and 6.95), respectively (Table 2). These results are in line with the report of Soni *et al.* (2021), who mentioned that using rice straw mulching improved values of soil health index and decreased EC. Organic mulches can reduce soil EC through two potential scenarios: a) mulches reduced water evaporation of soil and so leading to reduction of salt accumulation in soil; and b): water-soluble salts may be absorbed by mulch layer and lead to reduction of water EC when it reaches to the soil layer (Pakdel *et al.*, 2013; Alharb, 2015). In other words, using mulch reduces water evaporation and maintains soil moisture. Therefore, they lead to reduce the concentration of soluble salts in the soil surface and so, EC of soil can be reduced (Alharb, 2015).

Soils tend to become acidic as a result of using some organic mulch because of releasing carbon dioxide from organic matter when it is decomposing (Zhu *et al.*, 2018). Salinity and alkalinity problems are the most important factors limiting the growth of plants in arid areas because rainfall or irrigation isn't sufficient to leach accumulated salts out of the root zone (Wang *et al.*, 2015).

There was a significant effect of much on soil essential elements (Table 2). Samples containing organic mulches including sugarcane bagasse mulch and palm waste compost had the highest amount of available N (16.73% and 7.68%, respectively) compared to the other samples containing inorganic mulches ($p<0.001$) (Table 2). In addition, samples containing sugarcane bagasse mulch and palm waste compost had the highest amount of available P (1.86 and 2.26 ppm, respectively), along with oil-palm mulch (1.71 ppm) ($p<0.001$). Samples containing sugarcane bagasse mulch and palm waste compost, as well as samples containing cement-slag, oil-sugarcane, oil-palm, and cement- sugarcane mulch had the highest amount of available K, without a significant difference ($p<0.013$) (Table 2). According to the results, an increase in soil nutrients (N, P, K) is expected with the application of organic mulches. This is because as organic mulches decompose, they add nutrients and organic matter to the soil and beneficial microorganisms like nitrifying bacteria and mycorrhizal fungi are enhanced while undesirable pathogens that cause plant diseases are inhibited. Increased amounts of organic matter will improve soil tilt and drainage, increase soil moisture retention, reduce soil compaction, and attract earthworms. The results also showed that organic mulches in combination with inorganic mulches continued to have a positive effect on the increase of P and K. A similar report was provided by Fang *et al.* (2011).

According to the results, there was a significant effect of mulch on soil moisture (p<0.001) as well (Table 2). Using sugarcane bagasse mulch and palm waste compost the soil moisture increased to 24.61 and 23.03 %, respectively to the maximum values (Table 2) whereas using oil and cement-slag mulch and also their combination (oil-cement mulch), the soil moisture decreased to the minimum extent (Table 2). This is because organic mulches increase soil moisture through increasing infiltration, reducing evaporation, and modifying water retention capacity of the soil (Teame *et al.*, 2017). Increasing of soil moisture through the use of organic mulch, a decrease in soil temperature is expected. The results also showed that oil and cement-slag mulch, and also their combination decreased soil moisture to the minimum values. Part of this effect is due to the effect of this mulch on soil color and temperature. The color of the petroleum mulch was much darker than other mulches, making it a higher absorber for radiation (Kader *et al.*, 2019).

Table 2. Result of ANOVA and Mean comparisons for soil properties including Electrical Conductivity (EC, dS/m), pH, available nitrogen (N), phosphorus (P), Potassium (K) and moisture (%), in response to various mulches

SOV	DF	MS					
		EC (dS/m)	pH	Moisture%	N (ppm)	P (ppm)	K (ppm)
Block	2	0.980*	0.812	0.053	0.977*	0.259	0.139
Mulch	8	65.22**	26.44**	32.88**	26.47**	8.77**	34.80*
Error	16	48.09	0.001	48.09	0.153	0.032	1.35
CV%		3.93	6.43	2.57	9.20	6.43	0.90
Treatments		Means					
M0 (No mulch-control)		87.26c	7.13b	21.19bcd	14.50def	0.83d	1272.00b
M1 (Soil mulch)		92.48a	7.90a	17.03f	14.11ef	1.33bcd	1269.00b
M2 (Cement-slag mulch		89.10bc	8.12a	18.40ef	14.78def	1.15cd	1282.17ab
M3 (Sugarcane bagasse)		83.60d	6.77c	24.61a	16.73ab	1.86ab	1289.00a
M4 (Palm waste compost)		81.46d	6.95bc	23.03ab	17.68a	2.26a	1296.00a
M5 (Oil-cement mulch)		90.25ab	7.71a	18.97def	13.96f	1.20bcd	1271.50b
M6 (Oil-sugarcane mulch)		88.15bc	7.20ab	20.90bcd	15.30cde	1.53bc	1280.67ab
M7 (Oil-palm mulch)		87.96bc	7.23ab	20.04cde	16.31bc	1.71abc	1280.67ab
M8 (Cement- sugarcane)		88.81bc	7.27ab	21.69bc	15.40cd	1.58bc	1282.17ab

* and ** = significant at 5 and 1%, respectively,
Means followed by the same latter are not significantly different based on LSD's test

Effects of Organic Mulches on plant Growth traits

Results showed that there was a significant effect of mulches on all growth characteristics of caper plant except days to emergence (Table 3). Caper stem length was significantly higher in pots containing organic mulch including sugarcane bagasse mulch (and palm waste compost with average vales of 20.26 and 22.43cm, respectively, compared to plants in pots containing inorganic mulches (p<0.001) (Table 3). In addition, using sugarcane bagasse mulch and palm waste compost significantly increased leaf number (21.66 and 21.66, respectively), above ground fresh weight (2.58 and 2.83 g, respectively), and above ground dry weight (1.77 and 1.91 g) of caper plant (Table 3). Moreover, SPAD value of caper leaves was higher in the pots containing sugarcane bagasse and palm compost with average values of 41.40 and 41.97 unit, respectively (Table 3). Using organic mulches including sugarcane bagasse and palm compost and also non-mulching had decreased caper root length, with average values of 13.52, 15.43 and 16.93 cm, respectively, compared to other treatments ($p<0.02$). However, root dry weight was higher in those treatments (1.77, 1.91 and 1.66 g, respectively). Using oil much and cement-slag increased root fresh weight with values of 2.89 and 2.42 g, respectively, to the maximum extent whereas using sugarcane bagasse, palm waste compost and non-mulching with average values of 2.04, 2.07, and 1.92, respectively decreased root fresh weight to the minimum extent. In addition, root to shoot length ratio significantly increased with the application of sugarcane bagasse, palm waste compost and also non-mulching with average values of 0.87, 0.81 and 0.73, respectively.

The results indicated that organic mulches (sugarcane bagasse mulch and palm waste compost) improved growth characteristics of caper plant including stem length, leaf number, above ground fresh weight, above ground dry weight and SPAD value while mulch did not affect days to emergence. Similar results were obtained by Teame *et al.* (2017), who reported organic mulching increased yield of sesame because of its effect on improving soil moisture content. This result also is in line with Ajibola *et al.* (2014) who reported increased sesame yield in plots mulched with elephant grass. In many studies, the potential of organic mulches for enhancing plant growth through improving soil structure, increasing organic matter, and establishing patterns of nutrient cycling has been recognized (Yohannes 1999; Tiquia *et al.* 2002; Fang *et al.*, 2011). Since salinity, drought and also alkaline pH of the soil are the factors limiting caper plant growth in the test area, the results suggest that the use of organic mulch has been able to improve caper growth by reducing salinity, increasing soil moisture, essential elements and also adjusting soil pH.

In addition, the results demonstrated that using sugarcane bagasse mulch and palm waste compost decreased caper root length, but increased root dry weight and root to shoot length ratio. The results are in line with the results of Rostami *et al.* (2016), who reported that the root length was increased by higher salinity and lower moisture, indicating that the plant in this situation is trying to find more potential water and nutrients to absorb from soil by enlarging its root. It seems that allocating more water to the roots in order to prevent the effects of stress increases the fresh weight of the roots while reducing its dry weight. However, the stress forced the plant to spend more energy on root length (Pirasteh Anosheh *et al.*, 2011). Root characteristics are important for a plant to have relatively well established above-ground parts (Giménez, 2014). Plants respond to water and nitrogen availability by adjusting their root: shoot ratios (Ågren and Franklin, 2003). In general, when water and nutrient availability increases, plants allocate relatively less to their roots, which is consistent with a resource optimization hypothesis as increasing water and nutrient availability means that less effort is required to acquire this resource (Ågren and Franklin, 2003). Considering the abundance of crop and tree residuals in the country and cost of each material, the use of these organic mulches in comparison with the non-organic ones will be more economical (Kianian *et al.,* 2019).

Table 3. Result of ANOVA and Mean comparisons for growth related parameters of *Capparis spinosa* in response to various mulches

SOV	DF	MS									
		Days to emergence	Height (cm)	Leaf number	Root length	AGFW# (g)	AGDW (g)	RFW (g)	RDW (g)	RS	SPAD value
Block	2	1.37ns	10.95**	9.46ns	16.13ns	0.07ns	0.01ns	0.16ns	0.14ns	0.01ns	3.74ns
Mulch	8	1.15ns	6.75**	33.41**	20.39*	0.53**	0.49**	0.45**	0.45**	0.13**	10.24*
Error	16	1.04	3.45	5.85	7.56	0.10	0.03	0.09	0.10	0.07	4.95
C.V.		18.74	11.78	15.99	14.61	18.03	18.96	8.91	13.94	19.10	5.78
		Means									
M0 ¥		2.67a	17.10cde	19.00ab	16.93cde	1.84cde	1.01bc	1.92d	1.66ab	0.73ab	36.85d
M1		3.89a	14.40efg	14.33cde	19.33bc	1.41def	0.77cdef	2.89a	0.77cde	0.40de	38.38abc
M2		2.66a	14.10efg	11.33e	21.50ab	1.40def	0.69def	2.42ab	0.69de	0.28efg	36.95d
M3		2.77a	20.26ab	21.66a	13.52e	2.58ab	1.77a	2.04cd	1.77a	0.87a	41.40ab
M4		3.55a	22.43a	21.66a	15.43cde	2.83a	1.91a	2.07cd	1.91a	0.81a	41.97a
M5		4.33a	14.83efg	14.33cde	20.63abc	1.26f	0.69def	2.27bc	0.69de	0.30efg	37.84bc
M6		4.44a	16.00efg	16.33bc	19.46bc	1.55def	0.69def	2.24bc	0.69de	0.30efg	37.81bc
M7		3.78a	14.56efg	14.33cde	18.20bc	1.64def	0.69def	2.35bc	0.69de	0.29efg	37.85bc
M8		3.89a	16.16cde	14.00cde	18.20bcd	1.59cde	1.01bcd	2.23bc	1.01bc	0.43de	37.92bc

* and ** = significant at 5 and 1%, respectively,

Means followed by the same latter are not significantly different based on LSD's test

\# above ground fresh weigh (AGFW), above ground dry weight (AGDW), root fresh weight (RFW), root dry weight (RDW), root to shoot ratio (RS) and SPAD value of chlorophyll

¥ M0, no mulch (control); M1, oil much; M2, cement-slag mulch; M3, sugarcane bagasse mulch; M4, palm waste compost; M5, oil-cement mulch; M6, oil-sugarcane mulch; M7, oil-palm mulch; M8, cement- sugarcane mulch

Correlation between traits

The correlation coefficients between some of the examined variables are shown in Table 4. There were significant positive correlations between above ground dry weight of organs, SPAD value (R=0.60) and soil N (R=0.41). Moreover, there were significant negative correlations between above ground dry weight of organs and EC (R=-0.74) and pH (R=-0.57). There were significant negative correlations between SPAD value and soil EC (R=-0.52) and pH (R=-0.32) and also available N and soil EC and pH. From these results, it can be concluded that SPAD value, as an indicator of nitrogen and chlorophyll status of the plant, affects the dry weight of organs by increasing photosynthesis rate. In addition, soil EC and pH affect SPAD value (Ding *et al.*, 2018) by improving the uptake of elements in the soil by the plant and the photosynthetic efficiency of the plant (Gholizadeh *et al.*, 2017; Ding *et al.*, 2018). In addition, the negative relationships between caper growth indices and soil EC and pH indirectly showed the positive impacts of using organic mulches on improving soil properties such as available nitrogen to increase development of caper plants (Gholizadeh *et al.*, 2017; Ding *et al.*, 2018).

Table 4. Correlation coefficients dry weight (AGDW), SPAD value and Electrical Conductivity (EC), pH, and available nitrogen (N) of the soil average over various mulches

Variables	Chlorophyll	DM yield	EC	pH
DM yield	0.602**			
EC	-0.520**	-0.749**		
pH	-0.322*	-0.576**	0.699**	
N	0.412**	0.636**	-0.700**	-0.699**

* and ** = significant at 5 and 1%, respectively,

Conclusion

The findings of the present study highlighted that the tested organic mulches (sugarcane bagasse mulch and palm waste compost) significantly improved soil moisture and nutrients and reduced soil EC and pH. The findings also suggested the significant effect of organic mulch on improving the morpho-physiological characteristics of caper plants. It can be stated that since soil salinity, alkalinity and drought are among the most important factors limiting caper growth in the southern regions of Iran, using organic mulches can improve the growth of caper plant by reducing salinity, increasing soil moisture, and improving essential elements as well as pH adjustment. These results can recommend appropriate mulches to improve the soil properties and growth related variables of other nature plants in arid and semi-arid regions of Iran. The use of these mulches can play a significant role in reducing soil erosion and agricultural waste, as well as improving Farmers' economic cycle in the country.

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تأثیر مالچ‌های آلی بر ویژگی‌های خاک و خصوصیات رویشی کپر (*Capparis spinosa* L.) برای کاشت در مراتع ساحلی جنوب ایران

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چکیده. کپر گیاهی مقاوم به خشکی و خوراک طبیعی دام‌ها در مراتع ساحلی ایران است. با این‌حال، به دلیل شوری و قلیایی بودن خاک، رشد اکثر گیاهان بومی در مراتع جنوبی کشور محدود شده است. این مطالعه به منظور بررسی تأثیر مالچ‌های مختلف از جمله مالچ نفتی، سیمانی، باگاس نیشکر، ضایعات نخل و ترکیب آنها بر خواص خاک و ویژگی‌های رشدی گیاه کپر در سال ۱۳۹۹ در شهرستان دیلم، استان بوشهر، در جنوب ایران انجام شد. نتایج نشان داد که کاربرد مالچ باگاس نیشکر و مالچ ضایعات نخل، عناصر مغذی خاک شامل (نیتروژن، فسفر و پتاسیم) را افزایش داد. همچنین کاربرد این دو نوع مالچ، رطوبت خاک را به ترتیب به میزان ۲۴,۶۱ و ۲۳,۰۳ درصد افزایش داد ($p<0.01$). ولی مقدار هدایت الکتریکی خاک (۸۳,۶۰ و ۸۱,۴۶ دسی-زیمنس بر متر) و اسدیته pH خاک (۶,۷۷ و ۶,۹۵) به‌طور قابل توجهی کاهش یافت. در مقابل، با کابرد مالچ نفتی و سیمانی و ترکیب آنها، درصد رطوبت خاک به ترتیب به ۱۷/۰۳ ، ۱۸/۴۰ و ۱۸/۹۷ درصد کاهش یافت ($p<0.01$). کاربرد مالچ باگاس نیشکر و کمپوست نخل به ترتیب طول ساقه (۲۰/۲۶ و ۲۲/۴۳ سانتیمتر)، وزن بیوماس و عدد سبزینگی SPAD (۴۱,۴۰ و ۴۱,۹۷) گیاه کپر به طور معنی‌داری افزایش داد. همبستگی بین ماده خشک گیاه با شوری خاک EC ($R=-0.74$) و اسیدیته خاک pH ($R=-0.57$) منفی و معنی‌دار بود. یافته‌های این تحقیق نشان داد که مالچ‌های آلی بر تنظیم EC و pH خاک برای بهبود استقرار گیاه کپر در مراتع ساحلی ایران تأثیر قابل توجهی داشتند.

کلمات کلیدی: باگاس نیشکر، کمپوست نخل، شوری، قلیائیت، مراتع ساحلی