Dataset on some soil properties improvement by the addition of olive pomace

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Abstract
Soil amendment with olive cake produced from olive mills waste (olive pomace/cake) is an ordinary practice in olive producing countries in the Middle East. It is used to improve soil physical and chemical properties as well as cheap waste management approach. But, the olive cake contains small percentage of residual oil which may affect water holding capacity of soil and penetration rate in agricultural lands. The data provided in this article shows the influence of adding olive pomace to clay and sand clay soils in terms of water holding capacity (WHC), penetration depth and accumulate intake.
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1. Data

The soil water retention curves (SWR) are shown in Fig. 1 for clay soil (20% sand, 25% silt, 55% clay) and in Fig. 2 for sandy clay soil (55% sand, 5% silt, 40% clay) as affected by olive cake addition. The water
holding capacity (WHC) increased as olive cake application rates increased compared to the control in agreement with [4]. Clay soils hold more water at higher tensions compared to sandy soils because they have larger surface area. This in agreement with [5], who reviewed the effects of organic matter addition as soil amendment for many soils with different texture textures.

The penetration depths were read directly from the three transparent gradual scales cylinders (FEL5 Demonstration Infiltration Apparatus [2]). The penetration depths are shown in Table 1 for clay soil and Table 2 for sandy clay soil as affected by olive cake addition. The data shows that penetration depth increased as olive cake application rate increased. The addition of olive cake increased the soil organic content, which favor large soil aggregates formations, hence resulted in larger penetration depth [3,5].

The water accumulate intake (mL) is shown in Table 3 for clay soil and Table 4 for sandy clay soil as affected by addition of olive cake. The data shows that accumulate intake increased as olive pomace application rate increased, this in agreement with [3,4,6,7].

Normally, the clayey soil has less penetration and water intake than sandy clay soil as shown in Table 5, this in agreement with [5,8,9].

2. Experimental design, materials, and methods

Olive pomace addition on soil water holding capacity, penetration depth and accumulated intake were examined for clay and sandy clay Soils. The soils samples obtained from the top soils surfaces, crushed dried and passed through a 2 mm strainer to remove bulky fragments. The olive cake is shown in Fig. 3 which was obtained from a three phase olive mill, freeze-dried and ground to pass through a 1 mm sieve. Several tests were done for each soil at three olive cake application rates (3%, 6% and 9%) on dry weight basis in addition to 0% the control. For each test olive cake was added to the soil sample and

Specifications table

| Subject area          | Agricultural and Biological Sciences |
|----------------------|--------------------------------------|
| More specific subject| Soil Science                         |
| Type of data         | Table, graph, figure                 |
| How data was acquired| Laboratory measurements using pressure plate apparatus model number: 0750 SAIF [1] to draw soil water retention curves (SWR); The FELS Demonstration Infiltration Apparatus – Issue 1 was used for infiltration tests [2] |
| Data format          | Raw, analyzed                        |
| Experimental factors | Soil samples were dried and screen through 2-mm strainer while the olive cake freeze dried and ground to pass through 1 mm sieve |
| Experimental features| The effect of olive cake addition on clay and sand clay soil were investigated. Soil parameter studied were soil water retention curves (SWR), infiltration and water holding capacity (WHC) at olive cake addition of 3%, 6% and 9% by weight. A pressure plate apparatus was used to obtain soil water retention curves at a pressure range from 0.30 (wilting) to 1500 kPa (Saturation). FELS Demonstration Infiltration Apparatus [2] with three gradual perspex cylinders were used for penetration depth measurements. |
| Data source location  | Amman, Jordan, Latitude (' N) 29°33', Longitude ('E) 35°00', Elevation 772 m. |
| Related research article| Abu-Rumman Ghaida, Effect of Olive Mill Solid Waste on Soil Physical Properties. International Journal of Soil Science. 2016, 11(3): pp. 94–101. 10.3923/ijss.2016.94.101 [3] |

Value of the data

- The data showed that the addition of olive cake to soil improves soil properties such as: water holding capacity (WHC) and accumulation intake important factors for plant growth [3,4].
- Clay soils have larger surface area compared to sandy soil; therefore holding more water at higher tensions near the wilting point.
- Soils in semi-arid and arid regions are poor in organic matter as a result of desertification; the addition of olive cake to soil will increase soil fertility and penetration depth.
- The addition of organic matter reduce soil bulk density as reported in literature [5] which might reduce soils erosion as a result of soil aggregation improvement.
- The dataset may serve as a benchmark for future studies on the effect of olive pomace addition as soil amendments on other soils properties.
Fig. 1. Soil-Water-retention curves for clay soil as affected by olive cake.

Fig. 2. Soil-Water-retention curves for sandy clay soil as affected by olive cake.
mixed thoroughly in plastic bag before used. The penetration depths were read directly from three transparent gradual scales cylinders (FEL5 Demonstration Infiltration Apparatus [2]).

The olive pomace physicochemical properties are show in Table 6, which include moisture content, pH, organic C, N—P—K, (C/N) and ash.

Soil-water-retention curves were obtained according to Ref. [1] by pressure plate apparatus from welting pressure 0.30 to saturation pressures 1500 kPa, using 70-mm diameter PVC rings. The soil samples were saturate by distilled water. The soil moisture contents were evaluated at different suction pressure 30–1500 kPa. The SWR curves constructed for each soil represent the averages of the pressure plate tests from all rings.

2.1. Infiltration (penetration depth)

FEL5 Demonstration Infiltration Apparatus – Issue 1 [2] used for infiltration measurements. Soil samples were mixed thoroughly and filled gradually to avoid segregation of soil particles in cylinders.

| Table 1 | Penetration depth (mm) as affected by olive pomace addition for clay soil. |
|---------|---------------------------------------------------------------------|
| Time (min) | Pomace application rate (mm) | 0% | 3% | 6% | 9% |
| 0 | 0 | 0 | 0 | 0 |
| 2 | 25 | 30 | 35 | 40 |
| 5 | 35 | 40 | 50 | 60 |
| 7 | 55 | 60 | 70 | 75 |
| 9 | 65 | 70 | 80 | 83 |
| 12 | 80 | 85 | 100 | 105 |
| 15 | 90 | 100 | 120 | 125 |
| 20 | 115 | 130 | 145 | 150 |
| 24 | 125 | 135 | 170 | 180 |
| 34 | 135 | 150 | 183 | 195 |
| 45 | 139 | 157 | 200 | 210 |
| 50 | 145 | 165 | 210 | 223 |
| 75 | 152 | 175 | 220 | 233 |
| 100 | 154 | 180 | 225 | 240 |
| 125 | 157 | 190 | 235 | 250 |
| 150 | 160 | 200 | 250 | 265 |
| 200 | 165 | 215 | 265 | 280 |

| Table 2 | Penetration depth (mm) as affected by olive pomace addition for sandy clay soil. |
|---------|---------------------------------------------------------------------|
| Time (min) | Pomace application rate (mm) | 0% | 3% | 6% | 9% |
| 0 | 0 | 0 | 0 | 0 |
| 3 | 10 | 11 | 50 | 50 |
| 6 | 15 | 16 | 90 | 90 |
| 9 | 30 | 32 | 130 | 125 |
| 12 | 50 | 52 | 150 | 140 |
| 15 | 70 | 73 | 175 | 160 |
| 18 | 85 | 90 | 185 | 170 |
| 21 | 105 | 110 | 200 | 185 |
| 24 | 120 | 130 | 175 | 170 |
| 34 | 128 | 140 | 200 | 210 |
| 45 | 139 | 155 | 230 | 265 |
| 50 | 150 | 160 | 250 | 240 |
| 75 | 152 | 170 | 275 | 300 |
| 100 | 154 | 175 | 305 | 320 |
| 125 | 157 | 180 |  |  |
| 150 | 160 | 187 |  |  |
| 200 | 165 | 192 |  |  |
### Table 3
Accumulated intake (mL) as affected by olive pomace addition for clay soil.

| Time (min) | 0% | 3% | 6% | 9% |
|------------|----|----|----|----|
| 0          | 0  | 0  | 0  | 0  |
| 2          | 15 | 10 | 12 | 14 |
| 4          | 30 | 20 | 23 | 26 |
| 6          | 35 | 27 | 29 | 31 |
| 10         | 40 | 33 | 35 | 37 |
| 12         | 45 | 38 | 49 | 43 |
| 15         | 50 | 45 | 47 | 49 |
| 22         | 57 | 50 | 53 | 55 |
| 25         | 62 | 53 | 57 | 60 |
| 35         | 63 | 60 | 65 | 70 |
| 40         | 64 | 65 | 70 | 75 |
| 50         | 65 | 73 | 80 | 85 |
| 75         | 65 | 82 | 90 | 95 |
| 100        | 65 | 93 | 99 | 105 |
| 150        | 65 | 100| 107| 112|
| 200        | 65 | 100| 105| 110|

### Table 4
Accumulated intake (mL) as affected by olive pomace addition for sandy clay soil.

| Time (min) | 0% | 3% | 6% | 9% |
|------------|----|----|----|----|
| 0          | 0  | 0  | 0  | 0  |
| 3          | 4  | 5  | 15 | 20 |
| 6          | 7  | 9  | 20 | 25 |
| 9          | 10 | 13 | 25 | 33 |
| 12         | 13 | 17 | 35 | 48 |
| 15         | 16 | 19 | 40 | 57 |
| 18         | 19 | 22 | 50 | 65 |
| 21         | 23 | 26 | 60 | 75 |
| 25         | 25 | 32 | 70 | 85 |
| 34         | 33 | 35 | 78 | 85 |
| 45         | 43 | 45 | 85 | 90 |
| 50         | 47 | 50 | 90 | 95 |
| 75         | 50 | 53 | 100| 105|
| 100        | 58 | 65 | 112| 113|
| 125        | 63 | 70 | 110| 111|
| 150        | 65 | 78 | 110| 111|
| 200        | 65 | 75 | 110| 111|

### Table 5
Penetration depth and accumulated intake with (time).

|          | Clay       | Sandy clay |
|----------|------------|------------|
| Penetration depth (mm) | 0% (24 hr) | 3% (24 hr) | 6% (24 hr) | 9% (24 hr) | 0% (100 m) | 3% (100 m) | 6% (100 m) | 9% (100 m) |
| 160      | 210 (24 hr)| 290 (24 hr)| 300 (24 hr)| 180 (24 hr)| 280 (24 hr)| 305 (100 m)| 320 (100 m)|
| 160      | 210 (24 hr)| 290 (24 hr)| 300 (24 hr)| 180 (24 hr)| 280 (24 hr)| 305 (100 m)| 320 (100 m)|
| 69       | 95 (24 hr)  | 107 (150 m)| 112 (150 m)| 63 (24 hr)  | 78 (150 m)  | 112 (100 m)| 113 (100 m)|
| 69       | 95 (24 hr)  | 107 (150 m)| 112 (150 m)| 63 (24 hr)  | 78 (150 m)  | 112 (100 m)| 113 (100 m)|
Table 6
Physico-chemical properties of olive pomace.

| Property                        | Value  |
|---------------------------------|--------|
| Moisture content                | 60.90  |
| pH                              | 5.25   |
| Organic C                       | 620    |
| Total N (g/kg)                  | 2.4    |
| Total P (g/kg)                  | 0.65   |
| Total K (g/kg)                  | 1.05   |
| Carbon/Nitrogen (C/N)           | 30.50  |
| Ash (g/kg)                      | 75.3   |

Fig. 3. Olive pomace/cake.
up to 380 mm mark in the apparatus. Water discharge was collected by 500 mL beakers placed below the three infiltration cylinders. The initial soil and water surfaces were marked. Each cylinder received equal head of water of 100 mL at the same time. As the wetting frontage advanced, the differences between water and soil surface level were recorded at time intervals of (1, 3, 5, 7, 9, 20, 35, 47, 60, 75, 90, 110, 170, 250 min and after 24 hr). The accumulated water intake in the soil was determined using the following relations:

\[ I_D = I_W - I_S \] (1)

\[ H_D = H_W - H_S \] (2)

\[ A_I = I_D - H_D \] (3)

where \( I_0 \) is the initial depth, \( I_W \) and \( I_S \) are the initial water and soil surface heights, respectively, \( H_D \) is water depth as time elapsed and \( H_W \) and \( H_S \) are the heights of water and soil surface, receptively. \( A_I \) is the accumulated intake calculated from Eq. (3) after the data collected throughout the tests.

**Transparency document**

Transparency document associated with this article can be found in the online version at [https://doi.org/10.1016/j.dib.2019.103878](https://doi.org/10.1016/j.dib.2019.103878).

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