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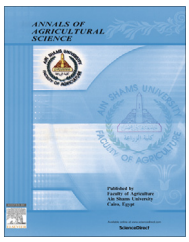

Fog water harvesting providing stability for small Bedwe communities lives in North cost of Egypt

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Abstract Water shortage is a serious problem faced by the national security of Egypt. Two field experiments were conducted at Marsa Matrouh Agricultural Research Farm during summer seasons of 2013 and 2014 using drip irrigation system, to evaluate the effect of some fog water harvesting models (f.w.h.m) of model-1, model-2, model-3 and model-4 under some farmyard manure (FYM) rates (20, 30, 40 m^3)/fad on groundnut productivity.

Results cleared that model-1 exposed its superiority on the total water amount harvested during the two seasons that led to give significant greatest values of, pods, seeds yield/plant or /faddan, biological yield/fad., shelling %, seed and harvest index, seed protein and oil percentage and water use efficiency, and also that model confirmed its superiority and led to give the lowest percentage of number of seeds/pod, number of pods and seed/100 (g). It is worthy to mention that, (f.w.h) model-1 also led to enhance peanut yield as compared to the other (f.w.h.m) during the two experimental seasons. Results revealed that, increasing (FYM) improves the most values of the previous peanut traits significantly, during the two seasons, and on the other hand, peanut shelling %, number of pod and seeds per pod decreased significantly by increasing the added amount of (FYM) /fad.

The interaction between f.w.h.m and (FYM) rates showed significant effect on, growing plant and per fad. Peanut plants under the condition of f.w.h model-1 fertilized by 30 or 40 m^3 of that fertilizer gave best significant values for most studied peanut traits compared with other treatments.

Introduction

Water shortage is a serious problem in arid and semiarid climatic zone around the world, especially in the Egyptian belts. Hundred % of belts area are located in sandy soil and dry areas and too far from the Nile valley. The small Bedwe communities who live in these areas have to undergo tremendous efforts to fetch water every day from the well for life activities. Some of these regions have low or no rainfalls and have regular fog events. It is possible to collect water out of fog in the area having high relative humidity by intercepting the fog droplets with large nets. The Bedwe communities easy to build and maintained it. Many countries followed that method to overcome water shortage problem Schemenauer et al. (2004). They reported that, the potential to collect fog water for fresh

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water production was investigated in the mountains near Hajja, north capital city of Sana'a and inland from the Red Sea in Yamen. In 2003, they found that, best sites produced averaged 4.5 L/m^2/day over the 3-month dry winter period using LFCs fog collectors after successful initiation. Sabino (2007), conducted many projects on the desert archipelago of Cape Verde, for fog collection to obtain water to meet the needs of the rural population. Many pilot sites were installed, all of them facing the N and NE on various islands, at altitudes between 750 and 1400 m above mean sea level (MSL). He reported that, the water collection rates range between 3 and 75 L/m^2/day. This will improve the living conditions of small Bedwe communities by providing them enough water for personal activities such as agriculture and hygiene consumption. That will help them to fail secure and gain them livelihood sources that make the life of these communities possible and this will be reflected on the stability of the Egyptian national security.

Peanut is planted in arid and semi-arid areas, and it is very rich in protein and oil of good quality. Drought is one of the limiting factors to peanut yield in many countries (Awal and Ikeda, 2002; Gohri and Amiri, 2011). Groundnut (*Arachis hypogaea* L.) has a unique importance in our country either for local use or as foreign exchange earner. The soil texture of Egyptian belts is generally light and well drained. The farmyard manure is one of the very important treatments, which improves the sandy soil properties specially increasing its water holding capacity to save and increase the utilization efficiency of water irrigation. Subrahmaniyan et al. (2000) indicated that organic manure has a profound effect on improving soil physical, chemical and biological properties and enhancing productivity of field crops. They also added that, groundnut fed by the application of FYM at 10–15 ton/fad increased the pod and haulm yields and improved the yield parameters such as shelling percentage, 100 seed weight and sound mature kernel compared to the recommended dose of fertilizers. Jagdev and Singh (2000), reported that the application of Farmyard manure (FYM) increased, shelling percentage, by 10%, 100 kernel weight by 32%, No. of pods and pod yield per plant.

This study was conducted to share one of the serious problems in our country that must be taken into consideration by evaluating some fog water harvesting models under different farmyard manure rates on groundnut productivity under the condition of Marsa Matrouh.

Material and methods

Two field experiments were conducted during the summer seasons of 2013 and 2014 at the farm of Marsa Matrouh Agricultural Research Station, to "Recruit some climate information to develop one of the ways to harvest water to improve one of the oil crops in desert area". The site description was as follows:- the average relative humidity was 82% and 81% through time period between 23 Am and 7 Am during 2013 and 2014 seasons, latitude N(31° 20$^-$), longitude E(27°−13$^-$) and altitude of the station in meters (HP) 30. The study aimed to evaluate the impact of some fog water harvesting models under different farmyard manure rates on yield, yield components and some chemical constituents of peanut (*Arachis hypogaea* L.).

Experimental treatments

Fog water harvesting methods

Description of atrapanieblas. The mean structure is called atrapanieblas (Spanish, meaning trapping fog). It mainly consists of a large meshes made of poly propylene material suspended vertically to the wind direction at 100 m far from the sea water by hanging it very tautly, between two posts to collect the water droplets out of the fog. As the fog passes through the meshes, the fog with its droplets is pushed through the mesh by the wind. The droplets then collide with the fibers of the mesh and stay attached to them. When the droplets accumulate and grow, they drip down the mesh. Underneath, along the base a drip rail (see Fig. 1) collects the fog water, which drips down the mash after it comes in contact with the mesh .The dimensions of the mesh are 3 m high and 17 m long. Thus, the area of one fog collector is 51 m^2. The base of the mesh is 2 m above the ground. The collected water in the drip rail is piped through PVC-pipes by gravity to small measured tank for each model. Every day at 7 Am clock the amount of harvested water was estimated, recorded and transmitted to special big tank for each model of volume 1000 L (1 m^3). That tank was connected by drip irrigation system covering 9 subplots for each model so, the total amount of harvested water during the growing season started form 20th of April before sowing at 15 days until 15th September and the date of stop irrigation can be calculated.

It is worthy to mention that all the meshes have been installed before planting by 15 days to collect sufficient amount of water needed for cultivation of groundnut irrigation.

The study covered four models of atrapaniebles as follows.

A- Double mesh had 220 stitches/cm^2 with shade coefficient of 70%.
B- Single layer mesh touching each other had 220 stitches/cm^2 with shade coefficient for each layer 70%.
C- Double mesh had 120 stitches/cm^2 with shade coefficient of 50%.
D- Single layer mesh touching each other had 120 stitches/cm^2 with shade coefficient for each layer 50%.

Farmyard manure fertilizer rates

To improve the hold capacity of experimental soil (sandy soil) and to save irrigation water, the study covered three farmyard manure rates as follows:-

1–20 m^3/fad	2–30 m^3/fad	3–40 m^3/fad

The amount of farmyard for each rate was calculated according to the area of the subplot and added during soil preparation.

Soil mechanical and chemical analyses

To be in touch with the soil fertility after applying the three farmyard manure, soil samples were collected from the experimental site before and after sowing and harvesting