

CHAPTER 1

INTRODUCTION

Rainfed agriculture plays and will continue to play a dominant role in providing food and livelihoods for an increasing world population (**Rockstrom et al., 2010**). Barley (*Hordeum vulgare* L.) considered one of the most important cereal crops grown along North Western Coast of Egypt under rainfed conditions. Also, it is grown in the newly reclaimed lands. Barley had been recognized as an adapted crop to adverse conditions and could survive and grow satisfactory under such conditions than several other crops. The major use of barley in North Western Coast of Egypt is for many purposes such as malting, brewing industry, animal feeding and many other uses. However there is recent interest in using the crop in human food (**Said, 1998**). Rainwater harvesting, based on the collection and storage of rainfall runoff, has been widely used for domestic use and agricultural production in arid and semi arid regions (**Jiang et al., 2013**). In arid and semi arid regions agriculture development processes where water irrigation is a scarce and costly input for successful crop production, water management studies has become an important aspect. However, water harvesting system is one of the most important asses all over the world. A preliminary survey indicated that a conservation estimate of the area which is currently under runoff irrigation is about 500000 hectares. The problem of water shortage in arid and semi-arid regions is one of low rainfall and uneven distribution throughout the season, which makes rainfed agriculture a risky enterprise. Therefore, new interests came up in recent decades to evaluate traditional water management techniques, most of them being simple, sure to implement and of low capital investment (**Prinz and Wolfer, 1999**). The classical sources of irrigation water are often at the break of overuse and therefore untapped sources of (irrigation) water have to be sought for increasing agricultural productivity and providing sustained economic base. Water harvesting for dry-land agriculture is a traditional water management technology to ease future water scarcity in many arid and semi arid regions of the world.

Therefore, there was chance to increase the storage water by developing the storage methods of rain water, the second approach in this respect is improvement of the soil profile capacity for holding more water and increasing the water supply to the cultivated area.

Rainfed areas cover about one million hectare in the North Western Costal of Egypt (with 500 km long and 20 km width). The rainfall in the growing season is highly variable and less than barley requirements, consequently water conservation is essential to stabilize the water availability for maximizing crop production and increase yield.

In the point of view on Egyptian North Western Coast, it can be observed that, the term of water harvesting is used to describe the process of collecting and storing water for later beneficial use from an area that has been modified or treated to increase production runoff, the collected water can be used for most purposes of domestic uses and growing of plants.

Yield of rainfed barley is much lower not only due to less moisture availability in soil, but also on account of poor nutrients (**Sawarkar and Goydani, 1996**).

Amount of N applied to barley had to be managed to insure that N is available throughout the growing season due to its important role in enhancing both vegetative and reproductive development. Under dry land conditions, barley fertilization considered as vertical factor to maximize yield and to water use efficiency. Also, the productivity of barley is affected by biofertilization most prominent. Utilization of associated bacteria to help increase nitrogen amounts in the barley rhizosphere appears to be a possible route for sustainable barley production in low rainfed areas. The increase in barley grain yield following inoculation with *Azospirillum spp.* was attributed to one or more of the following factors 1- Bacterial nitrogen fixation, 2- Bacterial production of growth hormones and 3- Increase in plant nutrient uptake.

Therefore, the aim of this study was to enhance barley productivity in North Western Coast of Egypt under rainfed conditions by using optimum relationship (portion) between catchment and cultivated areas with mineral nitrogen and biofertilization. It is hoped that the obtained results with the present study would help to obtain barley grain production by using the abovementioned factors under rainfed conditions of Egypt.