

# Changing Climatic Scenario and Yield of Sunflower in Pakistan



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## Abstract

Sunflower is the most important edible oils crop on global scale and adoptable to a wide range of climatic condition. In Pakistan it is cultivated because of its wide range of adaptability twice in year (spring and autumn). In weather up to date the climate change that increase CO<sub>2</sub> concentration and changing rain fall pattern. The regional and global climate is adversely affected by industrial ozone depletion, globalization and deforestation and increase in temperature. The rise in temperature and rain fall shift from winter to summer in Pakistan. In this regard the only solution is to change sowing time and develop temperature resistant genotypes to obtain maximum seed and oil yield from sunflower. It is concluded that cultivation of sunflower in autumn season in the month of July can give us maximum yield.

**Keywords:** Sunflower; Climate change; Temperature; Oil yield

## Introduction

Sunflower (*Helianthus annuus L.*) is an annual crop and the most important edible oils on a global scale. In 2015-16 the cultivated area of sunflower was 23.06 million hectares while the total production of sunflower 39.19 million metric tons worldwide. The leading producer country of sunflower is Ukraine, Russia, European Union, Argentina and China [1]. It is the third major crop in the world after soya bean and groundnut [2]. The sunflower seed contain 40-50% oil content 30% digestible protein and used as a source of food for humans. The oil of sunflower is highly used by heart patient because of high fatty acid low cholesterol level [3]. It is adoptable to a wide range of climatic condition. In Pakistan it can be cultivated because of its wide range of adaptability and grown twice during spring and winter. It is grown in autumn is usually faster in growth than that sown in spring [4]. Agronomic practices and yield component such as plant height, number of seed head<sup>-1</sup>, 1000-seed weight in sunflower are significantly influenced by the temperature, growth durations which are particular characteristics of seasonal changes [5]. In warm temperature the longer reproductive phase at the time of seed development (spring sown) of sunflower is favorable for seed yield and its contributing traits [4]. In autumn season due to low relative humidity and high temperature at the time of pollination which affects pollen, cause poor pollination produces less weight and infertile seed develop. The production of sunflower and growth parameters greatly affects due to different environmental factors such as temperature [6] distribution of rainfall [7] some agronomic practices, such as

sowing date [7] greatly affect the vegetative growth, quality and the seed yield and its component [8]. In short growing season sowing dates can play a vital role to determine the quality and seed yield. The positive response of early sowing dates greatly affect the growth parameter, yield and yield component, seed weight, oil percentage of sunflower [9].

## Discussion

Sunflower is the most important edible oils crop on global scale and adoptable to a wide range of climatic condition. Sowing date is a very important feature of growth and yield of sunflower to cope with changing climatic scenario. According to modern climate change the crop for the optimum productivity should be grown at suitable sowing times. It was found that the sowing time delay in year or season significantly effect and decrease the yield. In weather up to date the climate change showed increase CO<sub>2</sub> with global warming [10]. The regional and global climate are adversely affected by industrial ozone depletion, globalization and deforestation has increase temperature [11]. If the temperature and natural precipitation amount get higher in the area the sowing time in cropping system affect crop productivity both positively and negatively. The climatic condition showed the rise in temperature and shift of rain fall from winter to summer in Pakistan which is likely in stable in 2040 [12]. In Khyber Pakhtunkhwa and Punjab the shifting of rainfall is from October to March. Evolutionary benefit of sunflower hybrid has continuous high level of adoptability in a variety of environmental situation. The Photosynthesis, growing

cycle radiation use efficiency are effected by temperature [13]. The rate of photosynthesis is affected by temperature [14]. Environmental difference alters the phenology, Physiology and qualitative characteristics of sunflower. In early sowing time the plant take more time to emergence [15]. The germination of seed is stop in high temperature. By late planting the emergence, flowering and maturity delayed. The late sowing dates of plant become poor and shorter time duration from emergence to maturity become less which can affect the plant height and biological activities of plant. The greatest germination was observed at 30.40C to 35.40C [16]. In late sowing the leaf area index (LAI) and dry matter (DM) accumulation was decrease due to reduce in time from sowing to maturity. The highest biological yield was observed on June as compare to August [17]. The development of plant can be effect by temperature while the radiation can affect the potential yield. In aspect of growth and development the summer season is superior then winter season. In winter season the light interception is decrease while in summer period the crop continues maximum growth. In spring the crop growth and development is slow as compare to summer and autumn. The average daily temperature is increases from 150C to 270C less emergence to floral ination in sunflower about 19-23 DAS [18]. In unfavorable envirmetal condition the plant produced less amount of assimilates and cause poor pollination as a result empty grains [19]. Reported that in autumn growing crop oil and yield can decrease. Low humidity and high temperature can affect the pollination which may cause less weight of grain [20]. Determine that planting in month of July in autumn season significantly affect the seed yield and growth parameter with maximum head width, seed weight head-1 and thousand gain weight [21]. Indicated that in summer season the favor condition, the seed session and flowering stage increase the grain weight, seed yield and oil content while in rainy season the temperature were lower and the relative humidity increase and decrease the solar radiation interception.

### Conclusion

Sunflower is the most important crop among oil seed crops. It cultivation in Pakistan should be encouraged to cope the chronic shortage of edible oil facing by our country now a days. Due to changing climatic scenario its productivity is adversely affected, hence a problem arises to adjust its sowing time and producing of adoptable genotypes. From the results discussed it is concluded that the cultivation of sunflower in autumn season in the month of July can give maximum yield and oil production.

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