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Effect of dates of planting in Sunflower

D.K.Debata, RRTTS, G.Udayagiri(OUAT), Kandhamal-762100, Odisha, India

Abstract

One experiment was conducted to determine the appropriate planting time of sunflower in RRTTS, G.Udayagiri of Odisha duringrabi 2021-22 arranged in layout in randomised block design with four replications. Fertilizer's *viz.*nitrogen,phosphorus and potassium were applied as basal treatment based on soil test results. Vegetative, reproductive and yield parameters were collected to assess the influence of the treatment combinations on productivity of sunflower. Data collected wereanalysed using ANOVA . Planting date significantly affected all the growth and yield parameters . Plant height-133.10cm, No of leaves-27.10, flower diameter-15.60cm , seeds/head-2217.30 were recorded during 1st November planting whereas Plant height-117.30cm, No of leaves-19.80, flower diameter-8.60cm , seeds/head-1131.50 in 15th December planting. 1st November sowing produced significantly maximum yield (8.6q ha^{-1}) closely followed by 15th November sowing. Yield significantly declined by planting beyond 1st December. 15th December planting produced significantly lowest yield 5.4q ha^{-1}.The luxuriant growth of those planted late did not translate to seed yield because there was not enough water during the seed filling stage of growth.

Keywords: sowing dates, sunflower, planting time.

Introduction

Sunflower (*Helianthus annuus* L.) belongs to the family Asteraceae. *Helianthus* genus contains 65 different species (Andrew *et al*., 2013). Sunflower is the third largest oilseed crop in the world after soybean and rapeseed (Pilorgé, 2020).The name *Helianthus*, being derived from helios (the sun) and anthos (a flower), has the same meaning as the english name Sunflower, which has been given these flowers from a supposition that they follow the sun by day, always turning towards its direct rays. The sunflower that most people refer to is *H. annuus*,an annual sunflower. In general, it is an annual plant which possesses a large inflorescence (flowering head), and its name is derived from the flower's shape and image, which is often used to depict the sun. The plant has a rough, hairy stem, broad, coarsely toothed, rough leaves and circular heads of flowers (Khaleghizadeh, 2011). The heads consist of many individual flowers which mature into seeds on a receptaclebase(Seghatoleslami*et al.,* 2012. The popularity of sunflowers is driven by its versatility as an oil, seed and livestock feed, and the growing awareness about health and as a leisure snack making it one of the fastest growing crops in the world. According to its oil content, sunflower can be divided into oil type and non-oiltype.The oilseed sunflower has an oil content of 50–55%, and relatively low protein content at 16– 19%.The non-oil type has an oil content of 35% or less and protein content of 25–30% (Škorić*et al.,* 2012). Sunflower oil is regarded as a premium edible oil due to its high polyunsaturated linoleic fatty acid concentration, low linolenic acid content and its excellent nutritional properties (Seiler and Jan, 2010). Confection sunflower is developing a new trend in sunflower market segmentation, either used inshell (roasted or salted) for snack, or hulled for baking (Pilorgé, 2020), and has been commonly consumed in many countries, such as China, Russia, Ukraine, Hungary, Israel, Spain, and Turkey (Hladni and Miladinović, 2019). China has a tradition of eating (cracking) sunflower seeds representing almost half of the market consumption (Pilorgé, 2020). Sunflower seeds are processed either by dry roasting only (original flavor) or boiling and seasoned with different flavors. Sunflower seeds have long been the first choice in China for leisure, social events, and holidays due to its nutritional value, cheaper price

Senior Scientist(Plant Pathology),RRTTS, G.Udayagiri

compared to other nuts, and the unique cracking style of eating one seed at a time.sunflower cultivation is steadily increasing. According to the data shown in 2018, the major sunflower-producing countries in 2018 include Ukraine (576,0000 ha), the Russian Federation (6,942,000 ha), Argentina (1,426,000 ha), China (957,000 ha), Romania (1,025,000 ha), Bulgaria (842,000 ha), Turkey (689,000 ha), Hungary (625,000 ha), France (634,000 ha), and the United States (618,000 ha). In India the sunflower is traditionally cultivated in Karnataka, Maharastra and Andhra Pradesh. In recent years its cultivation has also been taken up in non-traditional states like Haryana, Punjab, UP, Gujarat, Tamil Nadu, Orissa, MP, and Rajasthan. Sunflower seeds are a rich nutritional source, boasting high levels of protein, fiber, minerals, and phenolic compounds . Sunflower crops are drought-tolerant and can be cultivated late in the rainy season. They are also utilized in farming systems for crop rotation, alternating with rice, beans, or corn. Demand for sunflower products has substantially increased, primarily for seeds and oil. Notably, sunflower-oil sales reached USD 18.50 billion in 2020 . In the subsequent year, numerous firms ventured into sunflower-seed production,

leveraging advancements in seed technology to bring about physiological and biochemical modifications. Grown as a fodder crop for livestock feeding, the cake of the seed after oil extraction is rich in protein and could supply 50% of protein requirement of laying chicken without significantly reducing egg production (Smith, 1965). The excellent pale yellow oil from the seed can also be used in the manufacture of soap, vanishes and as lighting oil in addition to its major use for cooking. Sachan and Singh (1977) have found the oil to have a potential value as fuel in diesel motor. Robertson and Morrison (1977) observed that the oil remains liquid at lower temperature, an advantage over olive oil and the best for margarine production. Sunflower has a deep tap root and very large lateral spread of surface roots (Purseglove, 1968). The roots Sowing date isone of very important abiotic factorspromoted crop growth and yield such assunflower (Kolte, 1985 and Abdou*et al*.,2011). Environmental variables, especiallytemperature are playing important role inchoice sowing dates, it is the key factorwhich affects plant growth, developmentand productivity of yield and oil (Kaleem*et al.,* 2009; Kaleem*et al.,* 2010a).North Sinai consider apart fromsemiarid region and it is promising regionfor cultivating sunflower crop.Differences of yield attributes in varyingseasons might be due to the differentclimatic conditions that are based ontemperatureprevailing during the crop lifecycle (Kll and Altunbay, 2005) various climatic and soil conditions. Crop display and yield characteristics are influenced by environmental disparity (Kaleem*et al*., 2010b). Quantitative parameters like stem diameter, plant height and biological yield of all sunflower hybrids were higher in spring when compared with autumn season where sunflower is sensitive to cold temperatures in autumn. Sunflower having higher physiological activity (Brouder and Volenec, 2008; Kaleem*et al.,* 2009) thus, the choice of suitable sowing dates may improve sunflower yield (Bange*et al.,* 1997; Villalobos and Ritchie, 1992). .Numerous research studies for different climates haveshown that sowing date influences the growth, seed yieldand quality of some oil crops such as rapeseed (Hocking,2001). Degenhardt and Kondra (1981) concluded thatdelayed seeding resulted in significant decrease in seedyield and harvest index. Excessive nitrogen fertilization ofsunflower reduced yield through an increase of plantheight that makes plant lodging (Bailey, 1990).Robinson *et al.* (1975) reported that one of the world most important annual crops grown for edible oil is sunflower (*Helianthus annuus* L) together with soyabeans, peanut and rapeseed . Grown as a fodder crop for livestock feeding, the cake of the seed after oil extraction is rich in protein and could supply 50% of protein requirement of laying chicken without significantly reducing egg production (Smith, 1965). The excellent pale yellow oil from the seed can also be used in the manufacture of soap, vanishes and as lighting oil in addition to its major use for cooking. Sachan and Singh (1977) have found the oil to have a potential value as fuel in diesel motor. Robertson and Morrison (1977) observed that the oil remains liquid at lower temperature, an advantage over olive oil and the best for margarine production. Sunflower has a deep tap root and very large lateral spread of surface roots (Purseglove, 1968). The roots sorb water and nutrients from depth not reached by maize and form better canopy than maize (Shivaramu and Shivashamkar, 1994). It takes up large amount of nutrients over a short period and the uptake is affected by many ecological factors namely soil water relationship, weather, nutrient supply and other soil factors (Chapman *et al*., 1993) .Allam*et al*., 2003). Esechie (1994) observed that late planting delayed emergence, flowering and maturity in Islero and Upsolveraflor hybrid of sunflower. Therefore, an experiment was conducted for effect of dates of planting for sunflower crop at RRTTS, G.UdayagiriKandhamal during rabi season.

Materials and Methods

One experiment was conducted at RRTTS, G.Udayagiri, Kandhamal to study the reaction of sunflower to dates of planting during rabi season of 2021-22. Plotsize-3x4.5cm,Row spacing-45x30cm,Design-RBD, treatments-4 and replications-5, seed rate-10kgha^{-1}, fertilizer dose- 40-40-20 N:P:K kg ha^{-1}, dates of planting-1st November, 15th November, 1st December and 15th December. Data on yield and yield attributing parameter have been taken .

Result and Discussion

The data indicated that 1st November sowing produced significantly maximum yield (8.6q ha^{-1}) closely followed by 15th November sowing. Yield significantly declined by planting beyond 1st December. 15th December planting produced significantly lowest yield 5.4q ha^{-1}(Table1) .The growth characters and yield attributes were also reduced on delaying planting from 1st November. Plant height-133.10cm, No of leaves-27.10, flower diameter-15.60cm , seeds/head-2217.30 were recorded during 1st November planting whereas Plant height-117.30cm, No of leaves-19.80, flower diameter-8.60cm , seeds/head-1131.50 in 15th December planting

Table 1. Effect of dates of planting in Sunflower

Date of planting	Plant height (cm)	No of leaves	Flower diameter(cm)	Seeds/head	Yield(q ha^{-1})
1st November	133.10	27.10	15.60	2217.30	8.60
15th November	123.10	25.40	13.00	1933.40	8.30
1st December	118.10	20.10	09.50	1600.60	5.90
15th December	117.30	19.80	08.60	1131.50	5.40
C.D(0.05)	5.68	1.54	1.71	-	1.26

The significant difference in the aforementioned vegetative parameters could be explained by availability of adequate moisture, which enabled roots to absorb enough nutrients for plant growth. This observation is in line with the report of Pandey*et al.* (1984) and Hussain*et al.* (1992). According to them, adequate moisture aids nutrient absorption to result in good growth response. Those planted early had their seed filling stage with adequate moisture compared with those planted late; as a result, they had good seed settings. This confirmed the essentiality of adequate water supply for good seed production of sunflower as reported by Hussain*et al.* (1992) and Malik and Ahmad (1993). However on the contrary, Allam*et al.* (2003) reported that planting date influenced oil content of Vidoc and Euroflora hybrid of sunflower.

Conclusions

1st November sowing produced significantly maximum yield . Yield significantly declined by planting beyond 1st December. The growth characters and yield attributes were also reduced on delaying planting from 1st November.

Future scope: Study of different dates of sowing in farmers field and MLTs.

Authors contribution: observations and analysis of data of yield and yield attributing parameters of sunflower.

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