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Yield Verses Sowing Dates

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Every year, Pakistan grows its most important staple food crop, maize, on Pakistan's largest farmland. The province of Khyber Pakhtunkhwa gets around half of what the rest of Pakistan does. In Pakistan's Peshawar region, scientists are attempting to determine the best time of year to sow OPV and hybrid varieties. It was observed that the sowing date had an impact on plant height and crop phenology. Additionally, sowing dates had an adverse effect on crop yield attributes. In terms of phenology and morphology, height, leaf area, cobs per plant, and plant weight, all had an effect on biomass and grain yields. According to research, the late June planting of maize crops after harvesting wheat or berseem significantly reduces productivity in the region. However, planting in August does not allow grains to mature sufficiently. Increased maize crop losses are seen in the Peshawar valley beginning around July 15.

Keywords: Sowing date, Maize variety, Crop phenology, Harvesting dates.

Introduction

Poaceae maize is a staple food in Pakistan, grown on a large scale. During the spring and summer, maize is a profitable cash crop in underdeveloped countries [1][2]. Summertime temperatures are expected to rise, while rainfall patterns are expected to change [3][4]. It has become more common for the monsoon season (July-August) to bring more rain, which impacts summer crops (e.g. Maize). The amount of rain is expected to increase over the course of the summer, according to forecasts. For a given location's production, the genotype-environment link is the most essential component [5]. Choosing the best time of year to plant a crop is dependent on factors including soil health, ideal temperature, and irrigation [6], [7]. To get the best harvest, you must plant at the correct time. Postponing the sowing process has been blamed for a significant decrease in production [8][9]. Maximizing yields has been attributed to planting at the optimum time and variety and adhering to proper maintenance practices [10][11]. [12][13]. Pakistan's and Khyber Pakhtunkhwa's (KP's) maize production is impacted by the region's typically wet and cold summer [4]. Hybrid corn has seen an uptick in popularity in recent years. Cropping systems suitable for maize sowing after the previous harvesting are compared to cropping systems suitable for maize sowing and modifications to yield available time, and for the locations that are profitable. Growers have a quandary when it comes to deciding which maize type to sow in a changing climate [14][15]. Choosing high-yielding crops is critical to future farming. Due to their life cycles, summer crops like maize are limited in their yield potential [4], [16]. KP's maize yields are still significantly lower than the country's average despite increased use of fertilisers in Pakistan and KP [17][18]. Although maize may be grown in KP, the most important challenge is picking the right time and plant type[19][20].

Knowing when to plant maize in the KP cropping system is critical because there are several possible sowing times. Pakistani farmers planted maize varieties from mid-June to early August to assess yields and performance during the post-wheat harvest season. [21].

Methods

An investigation was carried out in the early winter of 2018. High calcium carbonate content ($CaCO_3$>4%) in alkaline clay-loam soil with a pH of 8.6. Four distinct studies were done using a randomized complete block design and split plot arrangement[22]. Each experimental unit was 3.8 meters wide and 3.4 meters long and contained five rows of plants spaced 0.65 meters apart. It was time to use the tractor to prepare the seedbed as advised for maize after plowing twice at an acceptable field capacity for the sowing date and cultivating and rotating the seedbed [23]. The irrigation strategy was influenced by the crop's water needs and the weather. In order to compute flood irrigation, we used water flow rates and the timing of rainfalls. For all sowing dates, the soil was sufficiently moist due to the monsoon wet season. On days when rain was expected, the same amount of urea was applied at planting and a month later. Preparation of the seedbed was carried out with phosphorus. Weeds were manually eradicated using a hoe. When it comes to pesticide and herbicide use, the experiment units and planting periods remained the same [24] [25].

We counted seedlings at three separate locations to find out how many plants grew per square meter. Divided by the length and width of the rows, the data was converted to plants per meter square. The number of days that passed between the time of sowing and the time of tassel or silking was recorded. Counting backward from the date of sowing to the date of maturity can also be used to calculate the number of days until harvest. The height of five randomly selected plants at physiological maturity was measured. Five plants in the plot were used to calculate the LAI by calculating the total area of all leaves accessible on the measurement day [26]. Plants were multiplied by 0.71 and divided by the square footage of two rows of plants to get an average leaf area per plant. From the ground, the bearing height was measured on five typical plants. All of the participants were averaged out using a single

reading. After harvesting five ears, a ruler was used to measure their lengths in an experimental unit (cm). The grain count was determined by sampling five ears at random from a plot. At harvest, five ears from an experimental unit were selected at random. Several ears of grain were hand counted and averaged for a single row ear-1 number count. The percentage of grains to the total ear weight with grain was computed and given in percent. The cleaned grains were counted and weighed after threshing (g). In order to collect data on plant numbers, four rows of plants were manually counted. Plants per square meter were calculated by dividing the harvested area by the total number of plants. The three middle rows of an experimental unit were picked, packaged, and sun-dried for ten days when they were fully mature. The biological yield was determined by weighing each bundle. Dehusking, shelling, and weighing ears of grain were used to estimate the amount of grain produced. Data on biomass and grain yields were used to calculate harvest indices, then compared to total biomass yields. Before processing, every data was entered into a computer and double-checked. Randomized complete block design with split plots was used to analyze the data. For the comparison of means, the Least Significant Difference test was used after significant F-test findings had been obtained.

Results

However, the relationship between sowing dates and cultivars did not have a significant effect on plant height (cm). However, there was no statistically significant variation in height between plants sown. It was decided to use shorter plants for the seedling planting

Planting dates and types were determined by the length of the ears. In terms of sowing, sowing had the longest ear length with the highest ear length recorded For measurements of ear length, the treatment interaction was not significant. Based on data on the number of grains per ear, sowing dates and cultivars differed.

Biological matter synthesis and combustion

Maize planting dates and types had a significant impact on above-ground total biomass. Following that, the nonsignificant differences between genotypes were sorted in order of decreasing importance. Biomass levels were lowest with no significant differences. Grain yield was only affected by planting dates and cultivars. Sowing in August will result in the lowest yield.

Only varieties had a major impact on emergence because of seed diameters, water diffusion rates in the seeds, enzyme activation within seeds, and variety-specific seed vigor. Because seed size influences germination, different species have varying emergence times. For early-planted crops, the shorter days in August and September signal the onset of the reproductive phase and the final stages of maturation. Environmental elements such as temperature and photoperiod have a significant impact on the development of maize crops [27]. According to Khan et al, planting crops too late affects the number of days till silking due to seasonal climate variations [28]. Maize cultivars vary greatly in the time it takes to tassel and silk their ears. Various species can be classed as early, medium, or late maturity based on how well they operate vegetatively and reproductively in a certain climate, depending on how well they reproduce. There is a lot of variance in the height of plants. Planting a variety at the appropriate time of year ensures success. As a rule, early plantings produced taller plants, while later plantings results in shorter plants [29]. To ensure that the crop has enough time to grow, it must switch from vegetative to reproductive growth as temperatures fall. Early-planted crops have a longer vegetative development period than late-planted crops [30][31]. A variety of animals had varying heights due to their distinct biological makeup [32]. Planting dates were heavily influenced by the leaf area index. Because of better conditions for plant growth, it's possible that seeding early resulted in a larger leaf area [33][34]. Plants with good vegetative development may have been able to attain their

optimal internode length because of the early seeding on June 30. The morphological distinctions between cultivars reveal how different their genetic makeup is among the many cultivars [30]. Ear production was very consistent between June and July, but declined significantly from June to July. According to the number of ears a plant possesses, the optimum probable environment for that species is found there. Crop reproductive organs need the right temperature, photoperiod, and other environmental conditions to develop properly when the vegetative development phase is over. If these conditions are met, a crop will yield the maximum number of ears possible inside its canopy. This is closer to the perfect time for sowing and growing in this region [35][36]. The crop season began on July 20, which means the plants have developed ears later in the season because of a humid wet, and hot climate with a shorter photoperiod and limited light exposure, and hot humid durations induced by the expansion of monsoon rainfall in this area. Weather patterns changed when the crop reached its most rapid growth and/or reproductive development due to higher air temperatures and higher air moisture content[33]. By planting maize too late [37][38]it was found that cob length was reduced. Leaf area and growth capacity all contributed to the observed differences in cob length across the various species of corn [39]. The number of grains per ear decreased as a result of planting too late, whereas early seeding resulted in more.

Because of the early seeding, there were no concerns with fertilization or grain development [40]. Variations in ear length caused differences in grain per ear between varieties, number of rows per ear, number of grains per row, and size of individual grains [40]. When seeds were sown earlier in the season, the plants developed better reproductive organs and produced more rows per ear. In contrast, a researcher found a different outcome[41]. Differences in rows per ear between varieties could explain the status and the various performance in the environment. There was a correlation between early sowings and the number of days it takes for grains to attain full size and mass[42][6]. In early-seeded plants, assimilate storage needs a longer seed-filling period [19]. During the monsoon season, heavy corn cobs get stuck on the maize plants due to the wind and rain. Harvest density was not affected by sowing dates, however, it was by variety. It was discovered during the harvest that one species of plant was more susceptible to the area's strong winds than the others. In the development of crops, biomass and yield are the most significant variables to use as feed and food, respectively. Biomass output was strongly linked to the timing and type of seedings. Early seeding resulted in more biomass since the plant had more time to grow and operate.

Conclusion

To maximise sun light for biomass production, plants should be planted early in the growing season [40]. While later sowing yielded less grain, earlier sowing yielded more. Longer growth periods led to healthier plants with better characteristics, resulting in bigger yields [40]. The improved genetics of a variety influenced its grain output. The more uniform grain size of SB-92K97 and SB-909 results in increased grain yields. As a result of their health, plants that were sown early had higher grain yields per plant. A lack of biomass and higher grain weight loss resulted from the late planting period[43]. Due to its ability to transform dry materials into grains, the cultivar's harvest index is influenced [44].

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