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EFFECT OF CONJUNCTIVE USE OF NITROGEN AND FOLIAR ZINC ON GROWTH AND YIELD OF SUNFLOWER (*HELIANTHUS ANNUS* L.)

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خلاصہ

دوران 2018- 2017، سندھ ایگریکلچرل ریسرچ انسٹی ٹیوٹ، ٹنڈو جام، پاکستان کے تیلوں کے سیکشن کے تجرباتی شعبوں میں ایک فیلڈ تجربہ کیا گیا۔ خالص پلاٹ کا سائز 5 ایم × 3 میٹر (15 ایم 2) والے تین نقل شدہ بے ترتیب مکمل بلاک ڈیزائن میں سورج مکھی کی نمو اور پھولوں پر نائٹروجن اور فولانی زنک کے مشترکہ استعمال کے اثر کا اندازہ لگانا ہے۔ اس تجربے میں سورج مکھی کی قسم ہائسن 33 کا بیج استعمال ہوا تھا۔ تحقیقات کی تفصیلات یہ ہیں جیسے پودوں کی اونچائی (سینٹی میٹر)، تنا تناظر (سینٹی میٹر)، سر قطر (سینٹی میٹر)، بیج ہیڈ 1، بیج وزن ہیڈ- 1 (جی)، بیج انڈیکس (1000 اناج وزن، جی)، حیاتیاتی پیداوار (کلو گرام ہا- 1) اور بیجوں کی پیداوار (کلوہا- 1)۔ نتائج کو ذیل میں خلاصہ کیا گیا ہے۔ موجودہ مطالعے سے انکشاف ہوا ہے کہ علاج T2 = N @ 100 کلو گرام ہا- 1 + فولرزیڈ (3.0٪ conc.)، زیادہ سے زیادہ پودوں کی اونچائی (110.0 سینٹی میٹر)، تنا تناظری (7.2 سینٹی میٹر)، سر قطر (23.2 سینٹی میٹر)، بیج پیدا کرتا ہے ہیڈ 1 (1829.7)، بیجوں کا وزن ہیڈ- 1 (69.5 جی)، بیج انڈیکس (60.3 جی)، حیاتیاتی پیداوار (8413.6 کلوہا-1) اور بیج کی پیداوار (2549.5 کلوہا-1)۔ جبکہ پودوں کی کم از کم اونچائی (62.3 سینٹی میٹر)، بیجوں کا ہیڈ- 1 (975.1)، بیجوں کا وزن ہیڈ- 1 (39.4 جی)، بیج انڈیکس (34.5 جی)، حیاتیاتی پیداوار (2863.2 کلوہا- 1) اور بیج کی پیداوار (907.3) کلوہا 1- علاج T6 = N @ 150 کلوہا 1- nZ railoF 3.0٪ conc.) کے تحت دیکھا گیا۔ تاہم کم سے کم تنے کی تپش (3.5 سینٹی میٹر) اور سر قطر (13.7 سینٹی میٹر) علاج T1 = N @ 100 کلوہا 1 کے تحت مشاہدہ کیا گیا ہے۔ اس کے نتائج سے یہ نتیجہ اخذ کیا گیا ہے کہ نائٹروجن اور پودوں کی زنک کے مشترکہ استعمال نے تمام سورج مکھی کی افزائش اور پیداوار پر مثبت اہم اثر دکھایا ہے۔ N @ 100 کلو گرام ہا- 1 + فولرزیڈ (3.0٪ conc.) سورج مکھی کی مختلف قسم کی "ہائسن 33" کے بیجوں کی زیادہ سے زیادہ پیداوار (2549.5 کلو گرام ہا1) حاصل کرنے میں انتہائی مناسب علاج ثابت ہوا۔

Abstract

Field assessment was carried out in the oilseeds field experimental portion, Sindh Agriculture Research Institute, Tandojam, Pakistan, throughout the year 2017-18. To assess the impact of conjunctive nitrogen use and foliar zinc on sunflower growth and yield in a Randomized complete block design contains 3 replications and with the size of plot 5m × 3m (15 m^2). Seeds of "Hysun-33" sunflower variety were taken in this experiment. The details of treatments are i.e. height of plant (cm), girth of stem (cm), diameter of head (cm), index of seed (1000-grain weight per g), seeds head^{-1}, seeds head^{-1} weight(gram), biological yield (kg per ha) and yield of seeds (kg per ha). The present study exposed that the treatment T_2 = N @ 100 kg ha^{-1} + Foliar Zn (3.0% conc.), produced topmost plant height (110.0 cm), girth of stem (7.2 cm), diameter of head (23.2 cm), seeds head^{-1} (1829.7), weight of seeds head^{-1} (69.5 g), index of seed (60.3 g), biological yield (8413.6 kg per ha) and yield of seeds (2549.5 kg per ha). Whereas, the least plant height (62.3 cm), seeds head^{-1} (975.1), seeds head^{-1} weight (39.4 g), index of seed (34.5 g), biological yield (2863.2 kg per ha) and seeds yield (907.3 kg per ha) was observed under treatment T_6 = N at the amount of 150 kilogram ha^{-1} + Foliar Zn (3.0% conc.). However the least girth of stem (3.5 cm) and diameter of head (13.7 cm) was recorded under treatment T_1 = N at the amount of 100 kg per ha. It is accomplished from the outcome that all the treatments conjunctive use of nitrogen and foliar zinc resulted in positively significant influence on the growth of sunflower and on yield. N at the amount of 100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) for achieving maximum yield of seed (2549.5 kilogram ha^{-1}) of sunflower variety "Hysun-33" proved most appropriate treatment.

Key words: Nitrogen, Foliar Zinc, Growth, Yield, Seed, Sunflower *(Helianthus annus l.)*

Introduction

In whole world, Pakistan is the 3rd biggest edible oil importer, to a long term lack of edible oil seed production, which involves huge foreign exchange. Local oil seed production is currently estimated at 0.78 tons, covering only 27% of domestic demand, while 73% of the met during import. (Govt. of Pakistan, 2008-2009). Intended for the year of 2008 to 2009 (July to March), 1.29 million tons of edible oil was imported by

PAKISTAN which cost almost Rs.84.6 billion to mobilize its edible oil demand and in the world, befall the 3rd biggest importer of edible oil (Govt. of Pakistan, 2008-2009). However, edible oil demand has gradually increased, though production has stagnated. All this will require a more determined effort to boost domestic oil seed production. Sunflower is the main oil crops in Pakistan. It is planted on an area of 1.12 tons of oil with 0.75 tons of yield and 0.87 tons of oil. However, it has different uses as compared to other oilseed crops. (Govt. of Pakistan, 2008-2009; Jabran *et al*., 2008 and Razzaq *et al*., 2010). Normal sunflower yield is lower than the possible of hybrid, and suboptimal population is one more reasons for the low sunflower yields in Pakistan. Best population of plants depends directly on the rate of germination. Sunflower *(Helianthus annuus L.)* is a prospective crop that can bridge the gap among domestic require and production (Ahmad and Jabeen, 2009). In the Pakistan, efforts have been made, among other conventional oil crops, to increase the yield of sunflowers in order to conquer the shortage of edible oil, as at the minimum two crops of sunflower harvest in a year and very suitable for the existing agricultural ecological conditions. Between 2015 and 2016, the entire area under the cultivation of sunflower was 349000 hectares with production of seed 182000 tons and production of oil 69000 tons (GOP., 2016).

Nitrogen is the most significant crucial elements in most plant structures and functions (Ohyama, 2010). It 40% - 50% comprises for the dry matter of living protoplasm (Togun *et al*., 2003). Nitrogen promotes crop production by improving the distribution and accumulation of dry matter in crops (Papantoniou *et al*., 2012). The increase of sunflower seed yield was observed in different experiments with the appropriate quantity of nitrogen (Waraich *et al*., 2011). Nutrient uptake is limited by abiotic and biotic stresses under field conditions. Foliar application is another choice when deficiencies of nutrients cannot be corrected by the application of soil (Cakmak, 2008).

Zinc is a vital micronutrient for superior plants, mainly oil crops, its plants an important role in the activities of various enzymes (dehydrogenases, DNA polymerases and RNA) protein synthesis and carbohydrate metabolism. For the production of biomass zinc also play essential role (Kaya and Higgs, 2002). In addition, zinc maybe needed to produce chlorophyll, pollen and fertilization (Pandey *et al*., 2006). Shortage of zinc also influences the metabolism of carbohydrates, damage pollen formation, and reduction in yield (Fang *et al*., 2008). It was noted that the zinc application have a momentous effect on the yield of seeds, oil content of seeds and 1000-seed weight (Bybordi and Malakouti, 2007). Due to the existence of alkaline soil condition, Deficiency of zinc is the most common trace element deficiencies in Iran. Therefore, the application of zinc fertilizer is very important for rising of crop yield and improvement in the feature of crop. *Brassicaceae* family contains many species that considered nutritional and financial value and have been planted ever since 1500 B.C. Such crops are widely cultivated as cash crops, feed and industrial/ pharmaceutical crops (Ashraf and McNeilly, 2004). Brassica oilseed crops mainly grown in the world for industrial reason is rape-seeds, Brassica napus and Brassica campestris. Thus, current study was designed to examine the responses of sunflower to Zn and N under salt stress. Potential crop yields are limited for a number of reasons, most of which are connected with management of nutrient deficiencies. (Shaheen *et al*., 2011). In terms of nutrient management, the unreasonable use of nitrogen has an important role in negatively affecting crop productivity (Silberbush, 2002; Sawan *et al*., 2006). Nitrogen is a component of biological molecules (protein, amino acid, plant hormones, nucleic acid) enzyme ad coenzymes; deficiency of nitrogen is one of the main factors affecting crop productivity. General shortage of nitrogen in continuous cropping area is more serious (Gibbson, 2006); while the growth of plants is mainly related to use of nitrogen in the soil. The available of N is used directly for plant growth, improvement and reproduction (Don Eckert, 2010). Nitrogen also plays a main role in the canopy growth of crop and in solar radiation (Milford *et al*., 2000). In addition to the lack of macronutrients in the soil, it's also recognized that micronutrients in the soil are lacking. Among the micronutrients, Zinc plays an important role in pollination and seed setting. Therefore, deficiency of zinc in soil may be the reason for the decrease of seed formation and yield. Therefore, in order to eradicate zinc deficiency from human nutrition, it's necessary to improve zinc in oilseeds, legumes and cereal grains (Mooro *et al*., 2008). The cost of foliar nutrient application is low and it can respond quickly to plants (Oosterhuis and Bondada, 2001); since the main nutrients come directly from the leaf surface, they are very effective and do not have a significant negative effect (Arif *et al*., 2006). Compare with the single application, the combined application of soil N and foliar Zn can make better use of nutrients to produce yield than single application. It's also recommended to apply foliar N at concentration 0.5 to 1.5% and consider to climatic and irrigation conditions and a nitrogen fertilizer sludge of 60kg ha^{-1} N through soil (Ungureanu and Tabara, 2010). (Naseem *et al.*, 2012) recommended N at the rate of 180 kilogram ha^{-1} by soil for obtain excessive seeds yield and sunflower oil; although (Bhutto, 2013) recommended 120 kg per ha nitrogen by soil in addition to suggested P and K with foliar micronutrients doses for attaining elevated yield of sunflower.

The main aim of the proposal is to improve the utilization of nitrogen in sunflowers. Foliar application of Zinc could alleviate crop problems associated with soil deficiency. The development of an optimistic rate would be feasible and will be provide reliable nitrogen fertilizer application for conventional sunflower growers.

Materials and Methods

This trial was finalized in the oilseeds investigational field section, Sindh Agriculture Research Institute, Tandojam, Pakistan, in RCBD contains 3 replications. Size of plot was 5m × 4m (20 m^2). The variety of sunflower seed "Hysun-33" was sown through the assist of single row hand drill. Treatments details are given below:

Treatments = 06
T_1 = N @ 100 kilogram ha^{-1}
T_2 = N @100 kilogram ha^{-1} + Foliar Zn (3.0% conc.)
T_3 = N @125 kilogram ha^{-1}
T_4 = N @125 kilogram ha^{-1} + Foliar Zn (3.0% conc.)
T_5 = N @150 kilogram ha^{-1}
T_6 = N @150 kilogram ha^{-1} + Foliar Zn (3.0% conc.)

In fertilizers, one third of nitrogen (as urea) was given at sowing time and the left over nitrogen was given in 2 splinters with 1st irrigation and with 2nd, correspondingly. A constant P dose (50 kg ha^{-1}) as per recommendation was also given in addition to basal N in shape of SSP. Zinc rate on personal communication with agriculture chemistry section, Sindh agriculture research institute Tandojam, Pakistan. Totally five irrigations were applied at the interval of 15 days and weeding were performed manually. For dimension of parameters, five plants was taken randomly in each plot and tagged. After conclusion of interpretation on the growth parameters, the tagged plants was manually harvested and tie up in tiny bunches, and moved to threshing yard. The sunflower heads were manually threshed and seeds were gathered suspiciously to tally and record weight. The interpretations were collected on the subsequent study parameters:

Parameters were taken: Height of plant (cm), girth of stem (cm), diameter of head (cm), index of seeds (1000-grain weight per g), Seeds $head^{-1}$, seeds $head^{-1}$ weight(gram), , Biological yield (kilogram ha^{-1}) and yield of seeds (kilogram ha^{-1})

$$\frac{\textbf{Biological Yield plot}^{-1}}{\textbf{Plot size (m)}} \quad \textbf{X 10000}$$

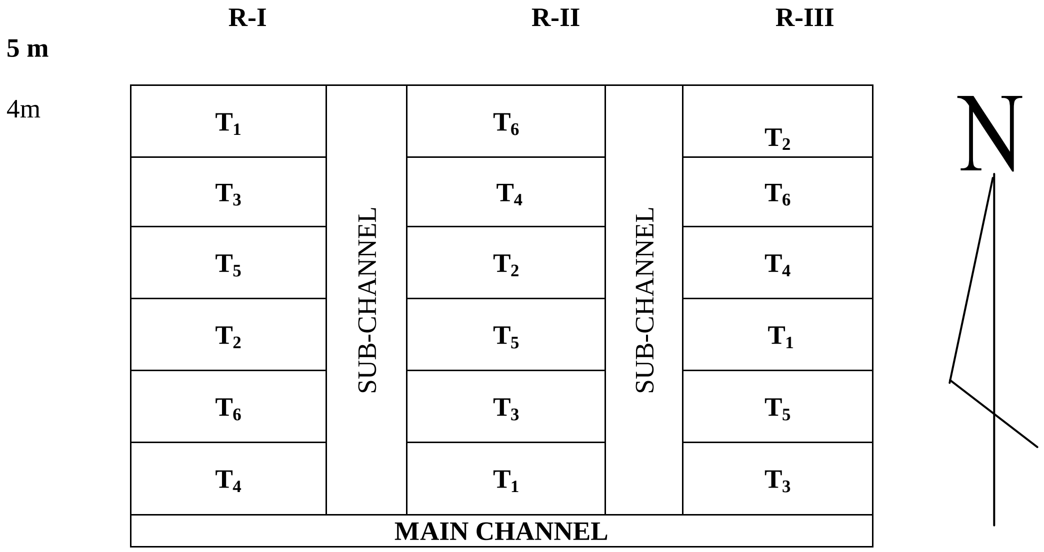
Seeds yield (kilogram ha^{-1}): On maturity, heads of sunflower from every plot was harvested and after threshing, yield per hectares was determined through the given principle:

$$\frac{\textbf{Seed yield plot}^{-1}}{\textbf{Plot size (m)}} \quad \textbf{X 10000}$$

Statistical analysis: Composed data was applied to statistical analysis by means of ANOVA methodology and LSD was engaged to distinguish the dominance of treatment by using of Statistix (Ver. 8.1).

Experimental layout plan

Layout of experiment = RCBD
Replications = 3
Net plot size = 5 m × 4 m (20 m^2)
Variety = Hysun-33
Treatments = 06
T_1 = N @ 100 kg ha^{-1}
T_2 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.)
T_3 = N @125 kg ha^{-1}
T_4 = N @125 kg ha^{-1} + Foliar Zn (3.0% conc.)
T_5 = N @150 kg ha^{-1}
T_6 = N @150 kg ha^{-1} + Foliar Zn (3.0% conc.)



Results and Discussion

The result on mean performance of sunflower variety conjunctive use of nitrogen and foliar zinc is given in fig 1-8. Findings of each character are presented below.

1-Height of plant (cm): The analysis of variance means for sunflower plant height variety conjunctive use of nitrogen and foliar zinc recorded are shown in the fig 1. Field trial of variable manifested how the diffracted in plant height (cm) among different treatment was statistically significant ($P<0.05$).

Findings reported that the least plant height (110.0 cm) was noted in treatment T_2 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.) followed by (91.0 cm) in treatment T_4 = N @125 kg ha^{-1} + Foliar Zn (3.0% conc.), whereas, the minimum height of plant (62.3 cm) was noted in treatment T_6 = N @150 kilogram ha^{-1} + Foliar Zn (3.0% conc.).

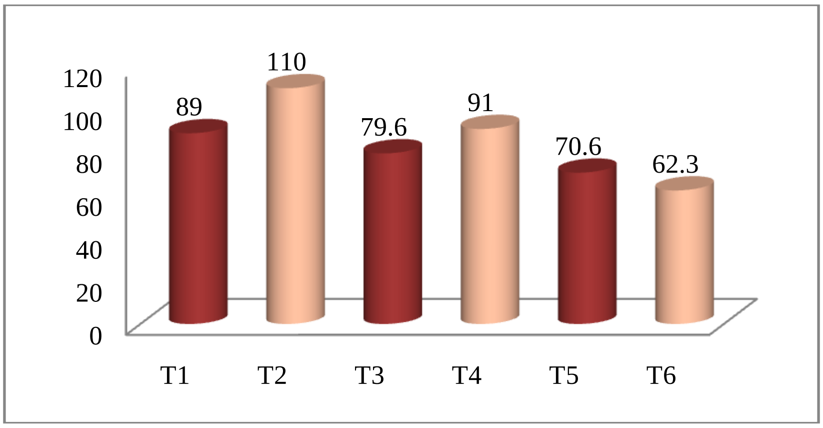


Fig 1. Plant height (cm) of sunflower as affected nitrogen and foliar zinc

2-Girth of stem (cm): The analysis of variance means for the girth of sunflower stem variety conjunctive use of nitrogen and foliar zinc recorded are shown in the fig 2. Field trial of variable showed how the diffracted in stem girth (cm) between various applications was statistically significant at $P<0.05$.

Findings showed that highest girth of stem (7.2 cm) was observed in treatment T_2 = N @100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) followed by (6.4 cm) in treatment T_3 = N @125 kg ha^{-1} and (6.4 cm) in treatment T_4 = N @125 kg ha^{-1} + Foliar Zn (3.0% conc.). Whereas, the minimum girth of stem (3.5 cm) was observed in treatment T_1 = N @ 100 kilogram ha^{-1}.

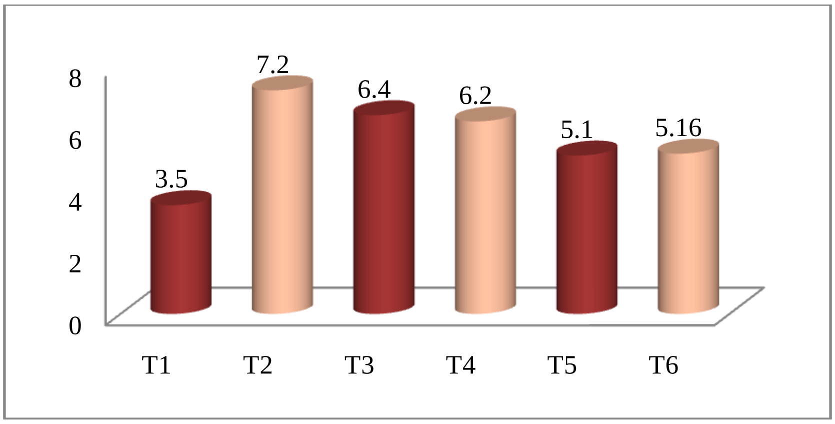


Fig 2. Stem girth of sunflower as affected by nitrogen and foliar zinc

3-Diameter of head (cm): The analysis of variance means for sunflower diameter head variety conjunctive use of nitrogen and foliar zinc recorded are shown in the fig 3. Field trial of variable showed how the diffracted in head diameter (cm) between various applications was statistically significant at P<0.05.

Findings showed that top most diameter of head (23.2 cm) was noted in treatment T_2 = N @100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) followed by (20.1 cm) in treatment T_1 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.). Whereas, the minimum diameter of head (13.7 cm) was recorded in treatment T_1 = N @ 100 kilogram ha^{-1}.

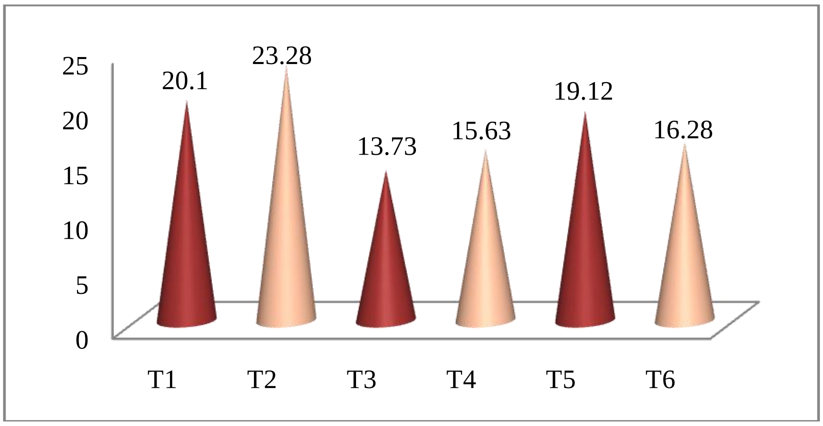


Fig 3. Head diameter (cm) of sunflower as affected by nitrogen and foliar zinc

4-Seeds head^{-1}: Analysis of variance means for sunflower seeds head^{-1} variety conjunctive use of nitrogen and foliar zinc recorded is shown in the fig 4. Field trial of variable appeared how the diffracted in seeds head^{-1} among various treatment was statistically significant (P<0.05).

Findings showed that highest seeds head^{-1} (1829.7) was noted in treatment T_2 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.) followed by (1728.6) in treatment T_4 = N @125 kg ha^{-1} + Foliar Zn (3.0% conc.). Whereas, the least seeds head^{-1} (975.1) was noted in treatment T_6 = N @150 kg ha^{-1} + Foliar Zn (3.0% conc.).

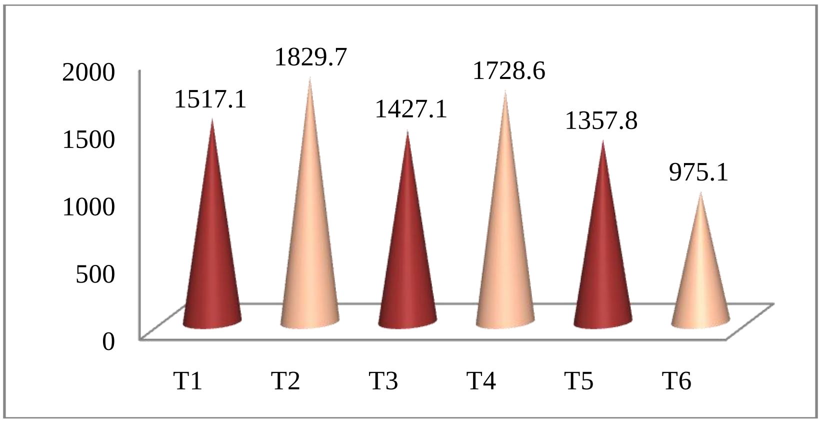


Fig 4. Seeds head^{-1} of sunflower as affected by nitrogen and foliar zinc

5-Seeds head^{-1} weight (gram): The analysis of variance means for weight of sunflower seeds head^{-1} variety conjunctive use of nitrogen and foliar zinc recorded are shown in the fig 5. The field trial showed that how the different in seeds head^{-1} weight between various applications was statistically significant ($P<0.05$).

The findings stipulated that highest seeds head^{-1} weight (69.5 g) was noted in treatment T_2 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.) followed by (66.5 g) in treatment T_1 = N @ 100 kg ha^{-1}, (59.9 g) T_4 = N @125 kg ha^{-1} + Foliar Zn (3.0% conc.). Whereas, the least (39.4 g) was recorded in treatment T_6 = N @150 kilogram ha^{-1} + Foliar Zn (3.0% conc.).

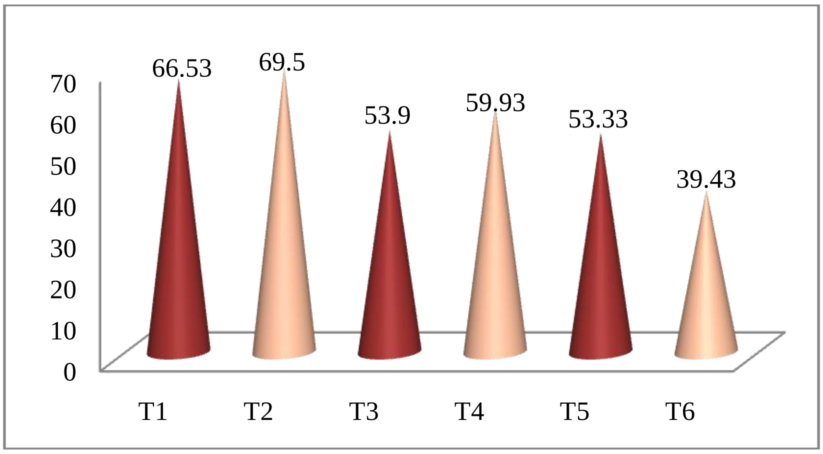


Fig 5. Seed weight head^{-1}(g) of sunflower as affected by nitrogen and foliar zinc

6-Index of seed (1000 seed weight per gram): Analysis of variance means for sunflower seeds index variety conjunctive use of nitrogen and foliar zinc recorded is shown in the fig 6. Field trial of variable appeared how the diffracted in seed index (gram) among various treatment was statistically significant ($P<0.05$).

Findings indicated that biggest index of seed (60.3 g) was recorded in treatment T_2 = N @100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) followed by (54.3 g) in treatment T_1 = N @ 100 kilogram ha^{-1}. Although, the least index of seed (34.5 gram) was noted in application T_6 = N @150 kg ha^{-1} + Foliar Zn (3.0% conc.).

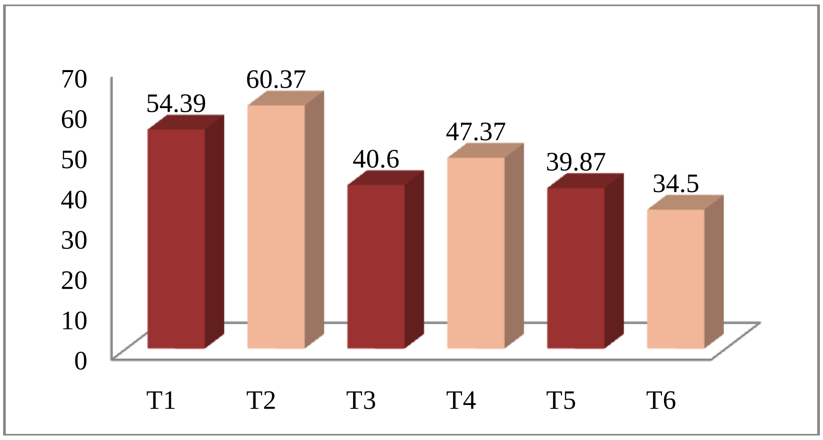


Fig 6. Seed index (1000 seed weight g) of sunflower as affected by nitrogen and foliar zinc

7-Biological yield (kilogram ha^{-1}): The analysis of variance means for biological yield (kilogram ha^{-1}) of sunflower variety conjunctive use of nitrogen and foliar zinc recorded are shown in the fig 7. Field trial of variable appeared how the diffracted in biological yield (kilogram ha^{-1}) among different treatment was statistically significant ($P<0.05$).

Findings indicated that highest biological yield (8413.6 kilogram ha^{-1}) was noted in application T_2 = N @100 kg ha^{-1} + Foliar Zn (3.0% conc.) followed by (6922.9 kilogram ha^{-1}) in treatment T_3 = N @125 kilogram ha^{-1} correspondingly. Although, the least (2863.2 kilogram ha^{-1}) was noted in treatment T_6 = N @150 kilogram ha^{-1} + Foliar Zn (3.0% conc.).

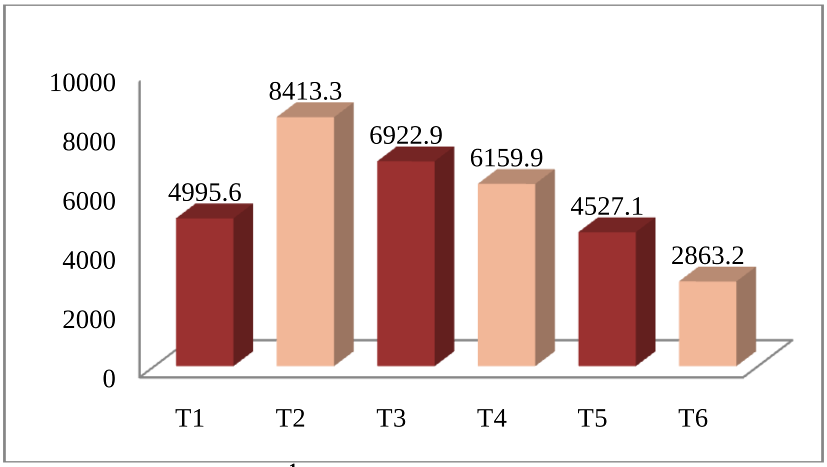


Fig 7. Biological yield kg ha^{-1} of sunflower as affected by nitrogen and foliar zinc

8-Yield of seeds (kilogam ha^{-1}): Analysis of variance means for the yield of sunflower seeds variety conjunctive use of nitrogen and foliar zinc recorded is shown in the fig 8. Field trial of variable appeared how the diffracted in yield of seed (kilogram ha^{-1}) among various treatment was statistically significant at $P<0.05$.

The outcome stipulated that highest yield of seeds (2549.5 kilogram ha^{-1}) was noted in treatment T_2 = N @100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) followed by (1971.5 kilogram ha^{-1}) in treatment T_1 = N @ 100 kilogram ha^{-1}. Whereas, the least yield of seeds (907.3 kilogram ha^{-1}) was noted in treatment T_6 = N @150 kilogram ha^{-1} + Foliar Zn (3.0% conc.).

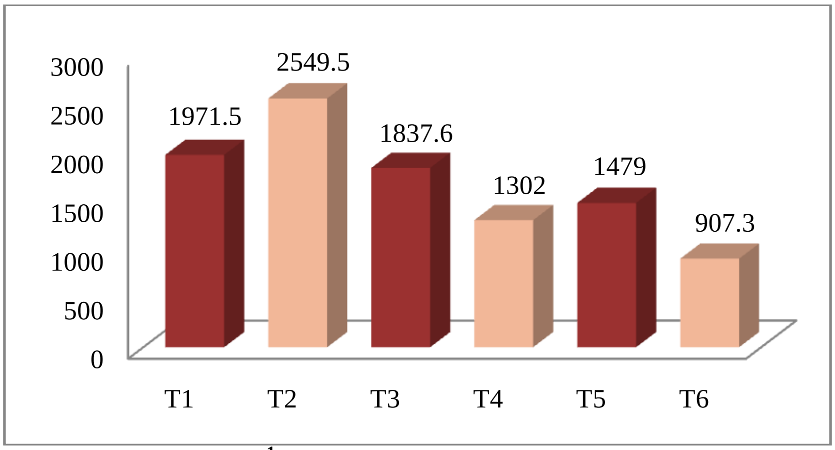


Fig 8. Seed yield kg ha^{-1} of sunflower as affected by nitrogen and foliar zinc

Amongst management of nutrients, pessimistic nitrogen rate has significant function in to manipulate the output of crop in negative path (Silberbush, 2002; Sawan *et al*., 2006). Nitrogen is the element of bio-molecules (amino acids, proteins, nucleic acids, phytohormones), enzymes besides coenzymes; and deficiency of N is the main factors to effect the efficiency of crop negatively. The universal lack of N has become more harsh in regions of constant cropping (Gibbson, 2006); while the growth of plant is mostly associated with availability of N in the soil. This nitrogen is directly available to the plant for the utilization of its growth, improvement and reproduction (Don Eckert, 2010). N also plays important role in the solar radiation interception and in the canopy of crop expansion (Milford *et al*., 2000). Nutrients foliar application is cheap in cost but provides rapid response in plant growth (Oosterhuis and Bondada, 2001).

The combine application of N and foliar Zn processes better utilization of nutrient for the production of yield in comparison to their individual usage whereas (Ungureanu and Tabara, 2010) recommended foliar N doses at the rate of 0.5 to 1.5% remembering the irrigation and climatic situations along with 60 kilogram ha^{-1} N by way of soil. Naseem et al., 2012 recommended that N at the dose of 180 kilogram ha^{-1} by way of soil for getting maximum yield of seeds and oil content in sunflower; whereas (Bhutto, 2013) recommended 120 nitrogen via soil in accumulation to suggested P and K in addition to foliar micronutrients doses for getting maximum yields of sunflower.

Results of this trial shows that height of plant (cm), girth of stem (cm), diameter of head (cm), seeds head^{-1}, seeds head^{-1} weight (g), index of seed (1000-grain weight, g), biological yield (kilogram ha^{-1}) and yield of seeds (kilogram ha^{-1}) of sunflower variety Hysun-33 as exaggerated by nitrogen & foliar zinc were considerably

($P<0.05$) effect. Doses of T_2 = N @ 100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) produced highest values in all growth of sunflower and yield traits. Though the application T_1 = N @ 100 kilogram ha^{-1} and T_6 = N @ 150 kilogram ha^{-1} + Foliar Zn (3.0% conc.) produced lowest in all parameters. Application of N @ 120 kilogram ha^{-1} improved growth and traits associated with yield of sunflower by twenty percent over 60 kilogram of N ha^{-1} when 2 urea sprays were also given at the beginning of flower & enhance the formation. Foliar application of 0.406 percent Ca when 50 percent flowering were completely manifested obvious findings by enhancing traits of yield (Sarkar and Mallick, 2009). Influence of various foliar fertilizers (Super Dawn, Agri power and Uni Grow-C) on sunflower growth and seeds yield. Doses consisted T_1 = 120 N + 60 P_2O_5 (kilogram ha^{-1}), T_2 = 120 N + 60 P_2O_5 (kilogram ha^{-1}) + Super Dawn, T_3 = Super Dawn (750 milliliter ha^{-1}), T_4 = 120 N + 60 P_2O_5 (kilogram ha^{-1}) + Agripower, T_5 = Agripower (1250 milliliter ha^{-1}), T_6 = 120 N + 60 P_2O_5 (kilogram ha^{-1}) + Unigrow-C and T_7 = UniGrow-C (1250 milliliter ha^{-1}). Findings exposed that all growth parameters and yield causal characters also seeds oil substance in sunflower was considerably effected by NP + foliar fertilizer compositions in comparisons with their usage exclusive of mixture ($P<0.01$). On the source of sunflower agronomic presentation among various doses of fertilizer, T_2 = 120 N + 60 P_2O_5 (kilogram ha^{-1}) + Super Dawn at the dose of 750 (milliliter ha^{-1}) stand 1st with 214 (cm) plant height, 7.88 (cm) stem width, 19.80 (cm) diameter of head, 806.56 seeds $head^{-1}$, 43.91 (gram) seeds $head^{-1}$ weight, 7.32 (g) index of seed, 2241.93 (kilogram) yield of seed ha^{-1} and 42.41 %age of oil substance; whereas T_1, where just 120 N + 60 P_2O_5 (kilogram ha^{-1}) were given and without foliar doses of fertilizer stand 4^{th} position with 183 (cm) tallness of plant, 7.25 (cm) width of stem, 18.68 (cm) diameter of head, 672.36 seeds $head^{-1}$, 35.61 (gram) seeds $head^{-1}$ weight, 6.24 (g) index of seed, 1898.40 (kilogram) yield of seeds ha^{-1} and 41.20 % oil substance. Though, T_6 stands second, T_4 stand in third position, T_3 stands fifth, T_7 stands sixth and T_5 stands seventh on behalf of seed yield ha^{-1} (Bhutto, 2013).

Foliar application with urea at various stages of growth had considerable ($P<0.05$) effect on the growth of sunflower and yield providing characters. Maximum yield of seed 2181.70 kilogram ha^{-1} was recorded in plantation applied foliar treatment of urea at the rate of 3% N at the stage of seed formation confirmed to be finest application when applied with suggested fertilizer rate in accumulation of N foliar application (Soomro, 2015).

Conclusion

It is accomplished from the findings that all the treatments conjunctive use of nitrogen and foliar zinc recorded positively significant influence on the sunflower growth and yield. N @ 100 kilogram ha^{-1} + Foliar Zn (3.0% conc.) for achieving topmost seed yield (2549.5 kilogram ha^{-1}) of sunflower variety ”Hysun-33” confirmed most appropriate application.

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