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Effect of Seed Soaking with Golden Grow on Growth, Yield and Yield Quality of Maize (*Zea Mays* L.)

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ABSTRACT: Maize seed quality determines the success of the production system. The use of quality seeds allows plants to grow simultaneously. The treatment that can be used to increase the viability of corn seeds is by soaking with water or golden grow solution. This study aimed to find the best seed soaking treatment effect in improving the growth, yield, and quality of corn plants. The study used a 1-factor *split plot* design, 3 levels of treatment and 20 replications. The results showed that the seed soaking treatment with golden grow gave the best growth and yield of corn compared to the farmer's seed soaking method

KEYWORDS: Seed, Golden Grow, Maize, Growth, Yield

INTRODUCTION

Maize is one of the second carbohydrate source food commodities after rice which has a strategic role in the national economy. The demand for this commodity continues to increase from year to year in line with the increasing food industry and animal feed industry. Therefore, when domestic production is insufficient, the government must import to meet these needs. According to BPS (2024), the production of dry shelled corn with 14% moisture content in 2023 amounted to 14.77 million tons, a decrease of 1.75 million tons or 10.61% compared to 2022 which amounted to 16.53 million tons.

The quality of maize seed determines the success of the production system. The use of quality seeds allows plants to grow simultaneously. The treatment that can be used to increase the viability of corn seeds is by using soaking with water or golden grow solution. Golden grow is a growth regulator that contains IBA (Indole butryic acid) hormone of 0.85%. IBA hormone is one of the hormones included in the auxin group. According to Gresiyanti et al. (2021) auxin hormones are able to stimulate cell elongation by affecting the flexibility of cell walls, which allows the entry of water by osmosis and causes cell elongation in plants. Explant growth in meristem cells located at the tip of the shoot can produce new cells and result in shoots increasing in length or height. According to research by Islamia et al. (2022), the application of auxin ZPT type IBA at a low concentration of 0.3 mg/L can accelerate the process of bud initiation in sugarcane plants in 1.5 HST.

RESEARCH METHODS

The research was conducted at Subak Kerdung, Moyo Island Road, Pedungan Village, South Denpasar District. This research was conducted from June to October 2024. implemented in May to October 2024. The research location is at an altitude of 5 m above sea level. The study used a 1-factor split plot Randomized Group Design (RAK), 3 treatment levels and 20 replications, namely Bp (Seeds soaked with water following the farmer's method without golden grow), Bs (Seeds sprayed with 5 ml golden grow/200 ml water/5 kg seeds) and Bg (Seeds soaked with golden grow solution (1 ml golden grow/1 liter water/1 kg seeds).

The research implementation included tillage, seed soaking treatment, planting, fertilization, maintenance and harvesting and post-harvesting. At the initial stage of tillage, land plots were selected with an area of each plot. The selected plots must be relatively homogeneous in terms of soil type, soil fertility, irradiation, irrigation water source, land slope, and cultivated from 1 landowner so that the history of land use is relatively homogeneous. In the seed treatment with soaking and spraying golden grow, the corn seeds used for research were separated into 3 lots according to the seed treatment level (Bp, Bs, and Bg). In the seed lot coded Bp, the seeds were soaked with water as per the farmer's method before planting. Soaking was done for 10 hours without golden growth, after soaking the seeds were lifted and then dried. In the lot with the code Bs, the seeds were sprayed with 5 ml golden grow /200 ml water/5 kg of seeds, then soaked for 4 hours accompanied by flipping the seeds to be exposed to

air evenly, after which the seeds were dried. At the Bg level, the seeds were soaked for 4 hours with golden grow solution (1 ml golden grow/1 liter of water/1 kg of seeds), then air dried. Soaking with water on the Bp seed lot was done simultaneously with spraying the Bs seed lot with golden grow and soaking the Bg seed lot with golden grow. The treated seeds were then planted in the plots according to the treatment code that had been determined. The spacing used was 40 cm x 75 cm with 2 seeds per hole. Fertilization uses Phonska and Urea fertilizers. The application of Phonska Plus was done as recommended for corn, which was only given once for the entire recommended dose at 7 hst (350 kg/ha), while the application of Urea was done twice, partly at the age of 25 hst (125 kg/ha) and partly at the age of 50 hst (125 kg/ha). Plant maintenance such as irrigation, thinning, weeding and pest and disease control will be carried out intensively in a manner similar to how farmers usually do it. Harvesting is done when the corn kernels have met the criteria of being ready to harvest, i.e. the kernels are physiologically mature or the kernels no longer receive photosynthate from the leaves. The physical criteria for harvesting maize are that the kelobot is yellow, the kernels are hard and the color of the kernels is shiny, if pressed with the thumb there are no pressure marks on the kernels. The harvested cobs are shelled, then observations are made on the quality and quality to find out the effect of the treatment given.

RESULTS

Percentage of germinated seeds, plant height, number of leaves and stem diameter

Seed soaking treatment (B) the highest percentage of growing seeds is obtained at the Bg treatment level which is 97.34%, but not significantly different from the Bp treatment level and significantly different from the Bs treatment level, with the lowest percentage of growing seeds obtained at the Bs treatment level which is 93.65%. The highest plant height in the seed soaking treatment (B) was obtained at the Bg level, 260.75 cm, but not significantly different from the Bp treatment level, but significantly different from the Bs treatment level, with the lowest plant height obtained at the Bs treatment level, 251.3 cm. The highest number of leaves in the seed soaking treatment (B) was obtained at the Bg treatment level, namely 13.30 strands, but not significantly different from the Bp treatment level and significantly different from the Bs treatment level, with the lowest number of leaves obtained at the Bs treatment level, namely 12.81 strands. The highest stem diameter was obtained at the Bg treatment level of 2.28 cm, but it was not significantly different from the Bp and Bs treatments, with the lowest stem diameter obtained at the Bs treatment level of 2.25 cm (Table 1).

Table 1. Effect of various seed soaking methods on the percentage of germinated seeds, plant height, number of leaves and stem diameter

Treatment	Percentage of seeds sprouted (%)	Plant height (cm)	Number of Leaves (blade)	Stem Diameter (cm)
Bg	97.34 a	260.75 a	13.30 a	2.28 a
Bp	94.94 ab	255.01 ab	13.09 ab	2.26 a
Bs	93.65 b	251.3 b	12.81 b	2.25 a
BNT 5%	2.81	8.22	0.46	0.07

Notes: Numbers followed by the same letter in the same column in the seed soaking treatment show no significant difference in the 5% level of the least significant difference test (BNT).

Leaf chlorophyll content, relative water content, leaf color and length

In the seed soaking treatment, the highest leaf chlorophyll content was obtained at the Bg treatment level, namely 43.39 SPAD but not significantly different from the Bp treatment level, but significantly different from the Bs treatment level, with the lowest leaf chlorophyll content obtained at the Bs treatment level, namely 42.64 SPAD. The highest relative water content was obtained at treatment level Bg which was 87.66%. and was not significantly different from all treatment levels, with the lowest leaf chlorophyll content obtained at treatment level Bp which was 87.44%. The highest leaf color was obtained at the Bg treatment level, namely 4.43 BWD units and was not significantly different from all treatment levels, with the lowest leaf color obtained at the Bs treatment level, namely 4.34 BWD units. The highest cob length was obtained at treatment level Bg which was 19.17 cm and was not significantly different from all treatment levels, with the lowest cob length obtained at treatment level Bp which was 18.88 cm (Table 2).

Table 2. Effect of various seed soaking methods on leaf chlorophyll content, relative water content, leaf color and length

Treatment	Leaf chlorophyll content (SPAD)	Relative Water Content (%)	Leaf Color (BWD unit)	Cob length (cm)
Bg	43.39 a	87.66 a	4.43 a	19.17 a
Bp	42.96 ab	87.44 a	4.35 a	18.88 a
Bs	42.64 b	85.59 a	4.34 a	19.07 a
BNT 5%	0.83	2.87	0.13	0.48

Notes: Numbers followed by the same letter in the same column in the seed soaking treatment show no significant difference in the 5% level of the least significant difference test (BNT).

Percentage of kernels, harvested dry seed weight per plant, seed weight at 14% moisture content per plant, weight per seed and number of seeds per plant

In the seed soaking treatment (B), the highest percentage of pithy seeds was obtained at the Bg treatment level of 96.70%, but not significantly different from the Bp and Bs treatment levels, with the lowest percentage of pithy seeds obtained at the Bs treatment level of 95.39%. The highest dry kernel weight per plant was obtained at the Bg treatment level of 225.29 g, but not significantly different from the Bp and Bs treatment levels, with the lowest dry kernel weight per plant obtained at the Bs treatment level of 219.15 g. The highest seed weight of 14% water content per plant was obtained at the Bg treatment level, which was 183.03 g, but not significantly different from the Bp and Bs treatment levels, with the lowest seed weight of 14% water content per plant obtained at the Bp treatment level, which was 177.76g. The highest number of seeds per plant was obtained at the Bp treatment level of 563.83 grains, but not significantly different from the Bg and Bs treatment levels, with the lowest number of seeds per plant obtained at the Bs treatment level of 558.21 grains. The highest weight per seed was obtained at the Bg treatment level of 0.41 g, but not significantly different from the Bp and Bs treatment levels, with the lowest weight per seed obtained at the Bs treatment level of 0.39 g (Table 3).

Table 3. Effect of various seed soaking methods on the percentage of pelleted seeds, dry seed weight per plant, seed weight at 14% moisture content per plant, weight per seed and number of seeds per plant.

Treatment	Percentage of kernels (%)	Dry seed weight per plant (g)	Seed weight at 14% moisture content per plant	Number of seeds per plant (grains)	Weight per seed (g)
Bg	96.70 a	225.29 a	183.03 a	559.74 a	0.41 a
Bp	95.80 a	220.34 a	177.76 a	563.83 a	0.40 a
Bs	95.39 a	219.15 a	180.00 a	558.21 a	0.39 a
BNT 5%	1.38	12.01	8.79	23.08	0.02

Notes: Numbers followed by the same letter in the same column in the seed soaking treatment show no significant difference in the 5% level of the least significant difference test (BNT).

DISCUSSION

Soaking seeds with a solution containing growth regulators such as *golden grow*, which is known to contain the hormone auxin, is proven to be able to increase various parameters of plant growth and yield. Seed soaking treatment with *golden grow* (Bg) gave the highest results in dry seed weight at 14% moisture content per plant, which was 183.03 g, 1.68% higher than the level of seed treatment with golden grow spray (Bs) and 2.97% higher than the level of seed soaking treatment with the farmer's method (Bp). The highest dry seed weight of 14% water content per plant at the Bg treatment level was also supported by the percentage of more growing seeds, plant height, larger stem diameter, higher relative water content, higher leaf chlorophyll content and leaf color. Soaking the seeds in *golden grow* increases germination, which indicates that more seeds are able to grow quickly and uniformly. This is the result of auxin activity that stimulates important metabolic enzymes in the process of imbibition and early seed respiration (Ernawati *et al*., 2017). Seeds with high germination generally come from good quality seeds with sufficient nutrient reserves, supporting strong early growth, so they can produce heavier seeds because the root system and photosynthesis are more efficient. The results of Wahyuningrum's research (2020) show that rice seeds with a higher 1000-grain weight have better viability and vigor, as well as more optimal vegetative growth. A high percentage of growing seeds contributes to better vegetative growth, resulting in taller plants. In addition, this treatment also increases plant height and stem diameter, as

a result of stimulation of cell elongation and division, as well as strengthening of vascular tissue by auxin (Andianingsih *et al*., 2021). The percentage of growing seeds is closely related to plant height as shown by the correlation value (r=0.999*), which means that the higher the percentage of growing seeds, the higher the plant height.

Golden grow soaked plants have a higher relative water content. This indicates the plant's ability to maintain cell hydration, which is important for metabolic efficiency and transportation of water and nutrients. High relative water content in the leaves causes the photosynthesis process to run more smoothly and moisture is maintained so that it supports the physiological processes of plants including flowering and fertilization, which in turn can improve the quality of the seeds produced. Research by Zhang *et al*. (2024), showed that plants with high relative water content in the leaves due to high soil water stability can increase photosynthetic efficiency and corn grain yield. Leaf chlorophyll content also increased significantly, which improved the photosynthetic capacity of plants. This improvement is shown visually through a greener and fresher leaf color, which is also an indicator of optimal plant physiological conditions. More efficient photosynthesis means more energy is available to support seed growth and filling, ultimately resulting in greater seed weight. The more intense green color on the leaves indicates a higher chlorophyll content (Rasyidi *et al*., 2024). This finding is also in line with the results of research by Puspitorini and Kurniastuti (2021), which showed that natural auxin immersion treatment can increase growth and yield in horticultural plants. A high percentage of pithy seeds can increase the weight of seeds with a moisture content of 14% and the administration of auxin hormones can play a role in improving seed quality and yield. The auxin will stimulate stem formation and cell division, as a result the germination power will increase. During the germination period auxin plays a role in encouraging cells in the roots and stems to enlarge and elongate (Patma *et al.*, 2016). The results of research by Adnan (2016) stated that the treatment of seed soaking in ZPT auxin had a very significant effect on germination, growth potential, vigor index, sprout height and root length of watermelon seeds. The content of auxin in golden grow can produce better seed quality so that quality seeds can support better plant productivity (CH Biotech, 2023).

CONCLUSIONS

Seed soaking treatment with golden grow gives the best growth and yield of corn compared to the farmer's method.

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REFERENCES

1) Andianingsih, N., Rosmala, A., & Mubarok, S. (2021). Effect of Auxin and Gibberellin Hormones on the Growth of Tomato (Solanum lycopersicum L.) Var. Aichi First. Agroscript, 3(1), 48-56. https://e-journal.unper.ac.id
2) Adnan, B. R. Juanda, and M. Zaini. 2016. Effect of concentration and soaking time in ZPT Auxin on the viability of expired watermelon (*Citurullus lunatus*) seeds. Samudra University.
3) Central Bureau of Statistics. 2024. Indonesia Population Projections 2020-2050. Central Bureau of Statistics: Jakarta.
4) CH Biotech. 2023. Keratine Hydrolysate Peptide (KHP) Technical Information. CH Biotech. R and D Co., LTD. Taiwan.
5) Ernawati, et al. (2017). Effectiveness of Seed Soaking Duration with Indole Acetic Acid on the Growth of Red Chili Seedlings (*Capsicum annuum* L.). https://www.researchgate.net
6) Gresiyanti, D. M., Anissa, R. K., Setyawati, F. D., Susanto, A. D., Yuliani, & Ratnasari, E. 2021. Comparison of Effectiveness of Shallot Extract and Synthetic Auxin on Corn (Zea mays L.) Root Growth. pp. 715-724. Proceedings of Biology Seminar 2 Biology Research Innovation in Education and Local Resource Development. Padang December 14, 2021
7) Islamia, N., Purnomo, S. S., Rahmi, H., & Suhesti, S. (2022). Bud Induction of Sugarcane (Saccharum officinarum L.) Variety CMG Agribun with Various Concentrations of Indole Butyric Acid (IBA) and Benzyl Amino Purine (BAP). Scientific Journal of Wahana Pendidikan, 8(1), 189-200.
8) Patma, A., Sari, R. M., and Simatupang. 2016. Plant Hormones. Jakarta: Indonesian Christian University.
9) Puspitorini, P., & Kurniastuti, T. (2021). Study of Natural Auxin Immersion Duration on the Growth and Yield of Red Onion (Allium ascalonicum L.). Viabel, 13(1). https://ejournal.unisbablitar.ac.id
10) Rasyidi, A. F., Sulistiani, R., Iqmal, S., & Jalani, B. 2024. Chlorophyll content of *Moringa* (*Moringa oleifera* L.) seedlings at various doses of compost. Agrium, 27(1), 32-43.
11) Wahyuningrum, A., Zamzami, A., and Agusta, H. 2022. Effect of 1000-grain weight on field emergence, growth and production in several rice varieties (*Oryza sativa* L.) Agrohorti Bulletin, IPB University.

12) Zhang, X., Zhou, W., Fan.D., Wei, Y., Yang, Y., Yu, ., and Zhang, J. 2024. Stabilized soil water availability enhances photosynthetic trains, water use, and yield in maize under alternate furrow irrigation. BMC Plant Biology, 24 (1)