Yield and Seed Quality Six Tomato Cultivars

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(Received: July 25, 2017, approved: 26 September 2017)

ABSTRACT

The information of seed yield and the quality of a strain are badly needed when the cultivars are going to be released as new varieties. The research was conducted at the Indonesian Vegetable Research Institute in Lembang, Bandung, West Java (± 1250 m asl) in the which the reaserch was conducted from April to August 2011. The study Aimed at Determining the seed yield and the quality of six tomato cultivars Comprising three candidate varieties and three commercial varieties are used as Comparation roomates amongst the cultivars. The research was done in a randomized block design with four replications. The results Showed CLN 2001 had a high seed yield like the varieties of pearl and Ground. Based on the seed quality, all cultivars candidate seed varieties had good qualities. A high-grain weight of 1000 seeds resulted by CLN 6046, CLN 2001 and LV 2862, had no significant differences from the one of Kaliurang. The cultivar of CLN 6046 resulted a high germination. The CLN CLN 6046 and 2001 cultivars resuted result of a high germination rate. The seed vigor of all cultivars were comparable to the one of the comparator varieties.

Key words: *germination, seed, tomato, vigor*

INTRODUCTION

The advantages of a variety of needs to be followed by the high quality of the seeds. Seed quality plays an important role in the process of production of a crop of vegetables. The seeds contain genetic information that determines the potential results, the ability to adapt to environment and resistance to pests and diseases. Seed quality produce rapid and uniform germination resulting in plants with good growth and uniform anyway.

The quality of a seed can be seen by physical and physiological properties. Physical seed quality seed shape characterized by pithy and 1000 grain weight is high. Seeds that have higher 1000 grain weight had the ability to germinate better because it has a lot more food reserves. Physiologically quality of a seed can be seen on the viability and vigornya. Viability and vigor of a picture can be seen from the germination of seeds. According Sadjad (1993), the germination test is one indication that provide direct information viability of a seed.

Genotype differences lead to differences in the characteristics of a plant seed (Adebisi and Ojo, 2001) and lead to differences in the quality of seeds produced. Research Nemati et al. (2010) showed that genotype differences lead to differences a tomato cultivars germination and speed of seed germination.

Genotype differences also result in differences in the ability of a plant to produce seed. Some genotypes produce the number of seeds per fruit more but less fruit per plant. On the other genotypes although the number of seeds per fruit slightly but the number of fruit per plant more. This resulted in the ability of each genotype to produce different seed. According Olaniyi et al.

(2010); Maršić et al. (2005); Mansour et al. (2009), the different varieties have the ability to adapt to different environments so that the cultivation of fruit and fruit per hectare differently. This directly affects the number of seeds produced.

Before a removable varieties need to know the potential yield and seed quality to provide guidance and facilitate farmers and seed producers in the process of seed propagation. This study aims to determine the yield and quality of seeds produced by six tomato genotypes comprising 3 cultivars and three commercial varieties for comparison.

RESEARCH METHODS

The study was conducted at the Research Institute of Vegetable Crops Lembang, West Bandung regency, West Java (± 1,250 m above sea level) from April to August 2011. The material used in this study is the third candidate cultivars of tomato varieties (CLN 6046, CLN 2001 and LV 2862) and 3 varieties already on the market as a comparison (Kaliurang, Opal, Pearls).

Research using Random Design (RBD) consisting of six genotypes of tomato and repeated 4 times. The study consisted of two phases of activity. The first phase of activities is the production of seed. Tomato seeds to test the quantity and quality obtained from plant selection with fruit size and uniform maturity level (60% - 90% red fruit). Fruit harvested fruit is healthy, not disabled and does not decay. Observations quantity of seeds include the number of fruits per plant, number of seeds per fruit and seed weight per fruit.

The second activity is the seed quality testing. The study was conducted in laboratory seed testing Vegetable Crops Research. Observations include the weight of a thousand seed quality grain seeds, germination, speed germination and vigor seed. Testing is done by using the seed vigor gravel red brick.

The data were analyzed by analysis of variance (Analysis of Variance) on the real level of five percent. Significantly different treatment were tested further by Duncan's Multiple Range Test at the 5% significance level.

RESULTS AND DISCUSSION

1. Quantity Seeds

Some components determine the number of seeds produced by plants of tomato, including the number of fruits per plant, seeds per fruit weight and number of seeds per fruit. As shown in Table 1, each genotype were capable of producing different seeds.

Based on Table 1, the number of fruits per plant were generated by the CLN 6046 and followed by LV 2862. The average number of fruits per plant varieties candidate more than the check varieties. The amount of fruit crops influenced by genotype (Hidayat, 2003; Sutapraja, 2008). According Olaniyi et al. (2010) The genetic composition of tomato plants affect the process of the development of flowers into fruits on these plants.

In addition to the genotype, environment and their interaction with genotype also affects the character of the amount of fruit. According to Suryadi et al. (2004) the difference between the amount of fruit cultivars tend to be caused by the interaction between genotype and environment. Environmental variation is divided into variations that can be controlled such as climate and soil

types and variations are difficult to control such as weather fluctuations which includes the amount of rainfall and temperature.

Weights highest seed per fruit is produced Pearls and not significantly different from the CLN 2001 and Kaliurang (Table 1). Lowest result obtained by CLN 6046 and Opal. Pearl tomato pericarp has walls are thin, small columella, small placenta and lokul more than other cultivars and varieties. The content of seed lots and large on every lokulnya make the Pearl as a producer of seeds with the highest weight.

Table 1. Seed yield components of six genotypes of tomato

genotype	Total Fruit per plant	The weight of seeds per fruit (G)	The number of seeds per fruit (Grain)
CLN 6046	41,61a	0,075c	77,25c
CLN 2001	26,94b	0,275ab	123,50ab
LV 2862	35,92a	0,175bc	98,75bc
OPAL	26,86b	0,075c	89,25bc
Ground	16,25c	0,25ab	139,5a
PEARL	19,92b	0,325a	150,5a

Description: The numbers in each column marked The same small letters are not significantly different according to Duncan Multiple Range Test at significance level of 5%

Based on Table 1, the highest number of seeds per fruit is produced by the Pearl, not significantly different from Kaliurang and CLN 2001. cultivar LV 2862 has the potential seed production are comparable with Opal. The weight of seeds per fruit is produced by CLN Lowest 6046. This indicates that the CLN 2001 cultivars have good seed production potential, so that the seed production process does not need to perform special handling. However, to produce seeds of cultivars CLN 6046 required certain techniques such as fertilization and additional arrangement of PGR in the process of cultivation to increase the number and weight of seeds produced.

2. Seed Quality

Each tomato genotypes tested produced a different seed quality for thousand grain weight and seed germination (Table 2).

The weight of a thousand grains highest seed produced by CLN 2001 is not significantly different from the CLN 6046, LV 2862 and Kaliurang (Table 2). This shows that the three cultivars candidate varieties have seeds with a good physical quality compared to commercial varieties that have been released. The high thousand grain weights caused by the large seed size and pithy on the third cultivars. According to Arief et al. (2004) seeds with higher 1000 grain weight had a size bigger so had more food reserves. Seeds with less food reserves have a low germination. Food reserves are needed by a plant to grow during germination phase before the leaves are formed and function normally.

Tabel2. Weight of one thousand grains and power germinated seeds of six genotypes of tomato

genotype	Thousand grain weights (g)	germination
CLN 6046	3,13ab	88,50a
CLN 2001	3,45a	86,50b
LV 2862	3,10ab	83,00c
OPAL	2,30c	97,00a
Ground	2,85abc	90,00a
PEARL	2,65bc	86,50b

Description: The numbers in each column is marked the same small letters are not significantly different according to Duncan Multiple Range Test at significance level of 5%

Opal has the highest germination, not significantly different from Kaliurang and CLN 6046 (Table 2). Lowest germination produced by LV 2862. Opal has thousand thousand grain weight is lower than LV 2862 but a higher germination. According Nerson (2007), in some commodity size and weight of the seed had no effect on germination. In the sunflower seeds are small seeds have a better germination of large

seeds. The difference is only visible on the size of the resulting sprouts. Sprouts produced by large seeds will have a size and a greater growth of the sprouts produced by a small seed.

According to Hill et al. (1983) distinction between genotype germination due to the growth and interaction with the environment is different for each genotype. Germination is the first step in the life cycle of a plant. Genotypes with good germination will produce a good crop growth as well (Nerson, 2007). 2862 LV germination the lowest compared to other genotypes, but still above 80% and still meet the standards of good seed quality (National Standardization Agency, 2004).

Based on Table 3, the average growth rate of all cultivars of 6.45 days. The highest growth rates were generated by Opal, not significantly different from Kaliurang, CLN CLN 6046 and 2001. The lowest growth rates were generated by cultivar LV 2862, not significantly different from the varieties of pearl. Based on the above speed data grows, quality seeds of tomato cultivars that will be released as a candidate for new varieties as well as varieties that have been released. growth rate low lead to seed longer exposed to the environmental conditions are not favorable for germination (Sabongari and Aliero, 2004).

The observation of seed vigor, showed that all cultivars did not differ statistically significant (Table 3). Seed vigor ranged from 61.5% to 83%. This indicates that the candidate cultivar varieties have the same vigor well with the comparator. Vigor demonstrated the ability of the seeds sprout and produce rapid growth of seedlings and uniform in very diverse environmental conditions (Nerson, 2007). A seed vigor influenced by genotype, environment, nutrition parent plant, seed maturity at harvest and pathogens.

Table 3. Germination speed and vigor of six genotypes of tomato

genotype	germinate speed	Vigor (%)
CLN 6046	6,36a	80,00a
CLN 2001	6,42ab	76,00a
LV 2862	6,91c	74,50a
OPAL	6,09a	83,00a
Ground	6,24a	82,50a
PEARL	6,70bc	61,50a

Description: The numbers in each column is marked the same small letters are not significantly different according to Duncan Multiple Range Test at significance level of 5%

CONCLUSION

Yield and quality of tomato seed production greatly influenced by genotype. Tomato genotypes with good results generated by seed pearls, Kaliurang and CLN 2001. In quality of all cultivars candidate varieties have good seed quality. Cultivars with high germination power generated by CLN 6046. cultivars with a high germination rate generated by CLN CLN 6046 and 2001. Vigor seeds of all cultivars candidate varieties comparable with varieties. Despite differences in some cases all three cultivars have good seed production potential.

ACKNOWLEDGEMENT

Acknowledgments conveyed to Mr. Ilham Nur of Siliwangi University in Tasikmalaya who have helped in the conduct of research.

REFERENCES

Adebisi, MA and DK ojo. 2001. Effect of genotypes on Soyabean Seed Quality under West African Development Rainfed Conditions. Pertanika J. Trap. Agric. Sci. 24 (2): 139-145.

Arief, R., E. and S. Saenong Samiun. 2004. Evaluation of Quality of Physical and Physiological Seed Corn Cv. Lamuru Seeds Of Size And Different Shelf Life. J. Science & Technology. 4 (2): 54-64.

National Standardization Agency. 2004. The seeds of tomato (Lycopersicon esculentum Mill.) Class open pollinated seedlings for distribution (BR). SNI 01-7008-2004.

Hidayat. 2003. Genetic variance and covariance properties Tomato Yield and Its Component. Journal Deed Agrosia 6 (1): 7-11.

Hill, HJ, SH West And WE Waters. 1983. Seed Yield And Quality Of Nine Florida Tomato cultivars. Proc. Fla. State Hort. Soc. 96: 141-144.

Maršić, NK, J. Osvald, M. Jakše. 2005. Evaluation of ten cultivars of determinate tomato (Lycopersicum esculentum Mill.), Grown under different climatic conditions. Agriculturae Acta Slovenica 85 (2): 321 - 328.

Mansour, A., HM Ismail, MFRamadan and G. Gyulai. Genotypic and phenotypic 2009 Comparative Analysis of Tomato (Lycopersicum esculentum) cultivars Grown under Two Different Seasons in Egypt. The African Journal of Plant Science and Biotechnology 3 (1): 73-79.

Nemati, H., T. Nazdar, M. Azizi and H. Arouiee. 2010. The Effect of Seed Extraction Methods on Seed Quality of Two Cultivar's Tomato (Solanum lycopersicum L.). Pakistan Journal of Biological Sciences 13 (17): 814-820.

Nerson, H. 2007. Seed Production and Germinability of Cucurbit Crops. Seed Science and Biotechnology 1 (1): 1-10.

Olaniyi, JO, WB AKANBI, TA Adejumo and OG Akande. 2010. Growth, fruit yield and nutritional quality of tomato varieties. African Journal of Food Science 4 (6): 398-402.

Sabongari, S. and BL Aliero. 2004. Effects of soaking duration on germination and seedling growth of tomato (Lycopersicum esculentum Mill). African Journal of Biotechnology 3 (1): 47-51.

Sadjad, S. 1993. From Seed To Seed. PT. Grasindo. Jakarta. 145 p.

Suryadi, Luthfy, K. Yenni, and Gunawan. 2004. Characterization of Local Tomato Germplasm Collection and Introductions. Germplasm Bulletin 10 (2): 72-76.

Sutapradja, H. 2008. Growth and Yield of Tomato Plant cultivars Diamond and Pearl on the Different Types of Soil. J. Hort. 18 (2): 160-164.