Contributions of Central Research Institute for Agriculture
Vol. 19, No. 3, July 2025, pp. 134~139
ISSN: 2962-9217, DOI: 10.59651/ccria
Published by: Central Research Institute for Agriculture (CeRIA)

Efforts to suppress weed growth in Red Chili (Capsicum annuum L.) planting and production based on the effect of planting distance

Rio Stepanus Tarigan[1], Delima Panjaitan[2]
[1,2]Depertement of Agrotechnology, Faculty of Agriculture, Universitas Katolik Santo Thomas, Medan, Indonesia

Article Info

Article history:

Received : Jun 10, 2025
Revised : Jul 02, 2025
Accepted : Jul 29, 2025

Keywords:

Planting Distance;
Red Chili Planting;
Production;
Weeds;
Red Chili.

ABSTRACT

This study aims to determine the effect of the combination of planting distance and suppressing weed growth on red chili (Capsicum annum L) plants and to determine the production results of red chili (Capsicum annum L). This study used a Non-Factorial Randomized Block Design (RAK) with J1 = Planting Distance 30 x 60 cm, J2 = Planting Distance 40 x 60 cm, J3 = Planting Distance 50 x 60 cm and J4 = Planting Distance 60 x 60 cm. In carrying out this study, land preparation, fertilization, planting, replanting, watering, weeding and harvesting are needed. The parameters observed were plant height (cm), stem diameter, production per plot, type of weed and number of weeds. Planting distance J4 is the best treatment in suppressing the height of chili plants and is significantly different from other treatments. giving planting distance treatment does not significantly affect the stem diameter. the effect of planting distance significantly affects the weight of red chili fruit per plot. The highest weight of red chili fruit per plot in treatment J1 was 138 g, significantly different from J4, but not significantly different from J2 and J3. The dominant weeds in the experimental field were narrow-leaved (Grasses) and broad-leaved (broad leaves). The treatment of planting distance was able to suppress weed growth, where the lowest number of weeds was obtained in the 50 x 60 cm. The highest fruit production per plot was in the 30x60 treatment and the lowest in the 60 x 60 cm.

Corresponding Author:

Rio Stepanus Tarigan
Program Study of Agrotechnology, Faculty of Agriculture, Universitas Katolik Santo Thomas
Jl. Setia Budi No.479-F, Medan 20132, Indonesia
Email: ryotrg9@gmail.com

1. INTRODUCTION

Red chili peppers (Capsicum annuum L.) are a member of the Solanaceae family. Red chili peppers are a common vegetable in everyday life. Their high daily demand makes them an essential commodity. Red chili peppers contain essential vitamins such as vitamin A, vitamin C, carotene, iron, potassium, calcium, and phosphorus, as well as alkaloids such as capsaicin, flavonoids, and essential oils (Devi Rizqi Nurfalach., 2010) Red chili peppers (Capsicum annum L.) have a wide adaptability. They can be grown in both lowlands and highlands, up to 1,400 meters above sea level. The flowering phase of red chili peppers is not significantly affected by day length. The flowering period will occur more quickly and the fruit ripening process will also be shorter if exposed to high light intensity for a long period. Loose, crumbly soil containing sufficient organic matter (at least 1.5%), nutrient-rich soil, and a weed-free environment are ideal for cultivating red chilies (Tani, 2011). The ideal soil pH for cultivating red chilies is between 6 and 7, and the soil temperature between 24 and 30ºC is highly conducive to their growth. Chilies don't last long and are always eaten fresh, making them essential for their availability. This has led to consistently high demand for chilies (Tangoi et al., 2018). According to the Department of Agriculture, total chili production in 2016 reached 1.96 million tons, increasing to 2.35 million tons in 2017. There was a slight decline in 2018 to 2.30 million tons. Production is projected to reach 2.90 million tons in 2019. Red chili production in 2016 reached 1.04 million tons, increasing to 1.21 million tons in 2017 and 1.12 million tons in 2019 (Utara, 2020).

Indonesia, being a tropical nation, possesses considerable potential for red chilli agriculture owing to its advantageous agro-climatic conditions, which encompass regular sunlight, elevated temperatures, and sufficient rainfall (Sedana, 2020). Nonetheless, despite these benefits, red chilli cultivation in Indonesia encounters numerous obstacles, including variable yields, pest infestations, and weed competition, especially during the rainy season when weed proliferation accelerates significantly (Alam et al., 2023) The significant perishability of red chilli peppers, coupled with volatile supply and demand, frequently leads to price variability and economic instability for growers (Haryono et al., 2025). Consequently, optimising agronomic practices, including suitable plant spacing and the incorporation of organic matter, is crucial for stabilising production and enhancing farmers' income (Sapto Priyadi & H. Haryuni, 2025). Modifying planting spacing to align with local environmental circumstances might inherently diminish weed pressure and enhance canopy coverage (Prabowo et al., 2020). This is particularly pertinent in tropical regions such as Indonesia, where weed proliferation is vigorous and manual weed management necessitates considerable labour and expense.

Moreover, the majority of smallholder farmers in Indonesia operate on restricted land with limited access to chemical agricultural inputs. Therefore, optimising yield per unit area by appropriate planting distance and the incorporation of organic matter constitutes a pragmatic and sustainable strategy (Puji et al., 2022). Investigations centred on these local cultivation variables can yield actionable recommendations that improve productivity while aligning with national goals for sustainable agriculture and food security (Mattalitti et al., 2024). Advancing this research is crucial to offer pragmatic solutions for farmers, agricultural extension agents, and policymakers to enhance the efficiency and sustainability of red chilli farming in Indonesia's tropical environment

One way to increase chili production is by adjusting plant spacing and providing appropriate organic matter. Plant spacing is a factor that can influence crop production. Increasing red chili production can be achieved by improving planting density. This can be done to increase chili yields. Increasing planting density per unit area can increase yields to a certain extent, but increasing the number of plants will decrease yields due to competition for nutrients, water, solar radiation, and growing space, thus reducing the number of fruits per plant (Nanda Firdaus , Yustitia Akbar, 2021)

Adjusting plant spacing within rows can suppress the growth of certain surviving weeds. Using narrow spacing can increase yields, provided limiting factors can be avoided to prevent inter-plant competition. Narrow spacing can increase plant competitiveness against weeds, as the plant canopy blocks sunlight from reaching the soil surface. Wide spacing slows the plant canopy from covering the soil surface, allowing weeds to grow well. Wide spacing slows the optimum LAI (Increased Intensity of Planting Area) to reach, but yields per area are low. A 70 x 60 cm spacing results in wide canopies in the early production phase, with plants appearing crowded. A 30 x 100 cm spacing results in higher yields per plant, but lower yields per hectare compared to spacings of 20 x 50 cm, 30 x 50 cm, and 20 x 100 cm (Imaniasita et al., 2020)

Planting spacing affects red chili plants. Planting spacing at a certain density aims to provide each plant with sufficient space for optimal growth. Spacing ensures optimal density and light efficiency, and competition among plants for water and nutrients affects crop production. At low densities, plants compete less with other plants, resulting in improved individualant performance. On the other hand, at high density, the level of competition between plants for light, water and nutrients becomes tighter so that plant growth can be hampered (Amir et al., (2024). Optimal planting distance or good planting distance is influenced by various factors. The factors that are influenced include the nature of the clones planted, the shape of the area (topography) and the desired density and so on so that they become factors that influence plants.

2. METHOD

This research was conducted over a period of six months, from January to June 2025, on local farmers' land in Bangun Saribu Village, Silimahuta Subdistrict, Simalungun Regency, North Sumatra Province. The tools used in this research included a hoe for land preparation, a ruler/measuring tape, stakes, and name plates. The planting material used was red chili (Capsicum annuum L.) seedlings of the Maghma variety.

The study employed a non-factorial Randomized Complete Block Design (RCBD) with a single treatment factor: J1 = plant spacing of 30 x 60 cm (18 plants), J2 = plant spacing of 40 x 60 cm (12 plants), J3 = plant spacing of 50 x 60 cm (10 plants), and J4 = plant spacing of 60 x 60 cm (8 plants).

Each treatment was replicated six times, with five sample plants per plot, resulting in a total of 24 plots and 286 plants. The distance between plots was maintained at 40 cm. Data collection was carried out systematically throughout the growth period. Measurements were taken at appropriate growth stages for the following parameters: plant height (cm) using a measuring tape from the soil surface to the highest point of the plant, stem diameter (mm) measured at 5 cm above the soil surface using a caliper, total yield per plot (kg) harvested at maturity and weighed using a digital scale, and weed observation through direct counting and identification of species present within each plot at peak weed growth. Weed density (number of individual weeds per square meter) and weed species diversity were recorded using quadrant sampling (1 m^2) placed randomly within each plot. The objective of this study was to determine the effect of different plant spacing treatments on suppressing weed growth and improving red chili yield. The data obtained were analyzed using a Non-Factorial Randomized Complete Block Design (RCBD). The statistical model applied was:

$$\mathbf{Yij = \mu + \beta j + Pj + eij} \quad \mathbf{(1)}$$

where **Yij** is the observed response for the i-th treatment in the j-th block, **μ** is the overall mean, **βj** is the block effect, **Pj** is the treatment effect, and **eij** is the experimental error.

Statistical analysis was performed using IBM SPSS Statistics version 25. Analysis of variance (ANOVA) was conducted to determine whether there were significant differences among treatments. If significant differences were found, the means were further compared using Duncan's Multiple Range Test (DMRT) at a 5% significance level. This hypothesis testing approach allowed identification of the most effective plant spacing for optimizing chili yield and minimizing weed interference under field conditionsThe tools used in this research included a hoe for land preparation, a ruler/measuring tape, stakes, and name plates. The material used was red chili (Capsicum annuum L.) seedlings of the Maghma variety. The research employed a non-factorial Randomized Complete Block Design (RCBD) with a single treatment factor as follows: J1 = Plant spacing of 30 x 60 cm = 18 plants, J2 = Plant spacing of 40 x 60 cm = 12 plants, J3 = Plant spacing of 50 x 60 cm = 10 plants and J4 = Plant spacing of 60 x 60 cm = 8 plants.

There were 6 replications, with 5 sample plants per plot, totaling 24 plots and 286 plants overall. The distance between plots was 40 cm. The parameters observed during the study included: plant height (cm), stem diameter, yield per plot, weed species, and weed count. The objective of this study is to determine the effect of different planting distance combinations on suppressing weed growth in red chili (Capsicum annuum L.) cultivation, as well as to evaluate the resulting yield of red chili (Capsicum annuum L.). The data obtained from the experiment were analyzed using a Non-Factorial Randomized Complete Block Design (RCBD). The linear model used for this design is expressed as: **Yij = μ + βj + Pj + eij**, where **Yij** represents the observed response value for the i-th treatment in the j-th replication, **μ** is the overall mean, **βj** is the effect of the j-th block, **Pj** is the effect of the weed growth treatment at level j, and **eij** is the random error associated with the i-th treatment in the j-th replication. This analytical approach allows for a structured evaluation of how planting distance affects both weed suppression and crop productivity under controlled field conditions.

3. RESULTS AND DISCUSSION

3.1 Plant Height

Analysis of variance revealed that plant spacing significantly affected red chili plant height at 8 weeks after planting. Observation data on the effect of plant spacing on red chili plant height can be seen in Table 1.

Table 1. Effect of planting distance on the height of red chili plants at ages 2, 4, 6 and 8 MST

Treatment	Plant Height (cm)			
	2 MST	4 MST	6 MST	8 MST
J1	11,08	13,96	18,26	18,88a
J2	11,52	14,68	18,70	19,20a
J3	11,12	14,72	18,26	19,44a
J4	11,98	14,40	18,50	22,66b

Table 1 shows that the J4 planting distance is the best treatment for suppressing the height of chili plants and is significantly different from the other treatments. This is because dense planting distance causes plant growth to elongate. Planting distance will meet density and efficiency of light use, competition between plants for water and nutrients, which will affect crop production (Aminuddin, 2017). At low densities, plants compete less with other plants, resulting in better individual plant performance. Conversely, at high densities, the level of competition between plants for light, water, and nutrients becomes more intense, so plant growth can be hampered (Assagaf, 2017).

3.2 Stem Diameter

Analysis of variance revealed that planting distance had no significant effect on red chili pepper stem diameter at 2, 4, 6, and 8 weeks after planting. Observation data on the effect of planting distance on red chili pepper stem diameter can be seen in Table 2.

Table 2. The Effect of Planting Distance on the Diameter of Red Chili Stems at Ages 2, 4, 6 and 8 MST

Treatment	Stem Diameter(cm)			
	2 MST	4 MST	6 MST	8 MST
J1	0,48	1,27	2,32	4,40
J2	0,48	1,29	2,33	4,20
J3	0,47	1,26	2,32	4,08
J4	0,46	1,29	2,34	4,44

Table 2 shows that the spacing treatment did not significantly affect stem diameter. However, the largest stem diameter parameter was at 8 WAP, namely at a planting distance of J4, at 4.44 cm. This is suspected because the addition of manure can improve soil physical properties such as water-holding capacity, porosity, and soil bulk density (Suryatini, 2018). The interaction between manure and soil microorganisms can improve soil structure. This can occur because the products of decomposition by soil microorganisms, such as polysaccharides, can function as glue or strengthen the adhesive between soil particles. This condition directly affects the porosity of sandy soil because manure can act as a stabilizer of aggregates that are larger than clay (Erni Suryani, 2022)

3.3 Fruit Weight Per Plot

Analysis of variance revealed that planting distance significantly affected the weight of red chili peppers per plot. Observational data on the effect of planting distance on the weight of red chili peppers per plot can be seen in Table 3.

Table 3. The effect of planting distance on the weight per plot of red chilies

Treatment	Sample Production (g)
J1	138,00b
J2	99,00b
J3	86,20ab
J4	51,00a

Description: Numbers followed by the same letter in the same column mean that they are not significantly different at the 5% DMRT test level.

Table 3 shows that the effect of planting distance significantly affects the weight of red chili fruit per plot. The highest weight of red chili fruit per plot was in treatment J1 at 138 g, significantly different from J4, but not significantly different from J2 and J3. The greater the distance between plants, the smaller the population of red chili per plot, resulting in fewer fruits produced (Vera et al., 2020). Conversely, the smaller the planting distance, the larger the population of red chili per plot, resulting in more fruits produced per plot. This is supported by (Pratiwi et al., 2014) who stated that the number of plant populations is the most important factor in obtaining maximum results.

3.4 Types and Number of Weeds

The dominant weeds in the experimental field were narrow-leaved and broad-leaved weeds. The types and numbers of weeds found in the experimental field can be seen in Table 4.

Table 4. Types and Number of Weeds Found in the Experimental Field

Treatment	Types of weeds	Block						Total	Total per plot
		I	II	III	IV	V	VI		
J1	Rumput Belulang (*Eleusine indica L.*)	25	28	22	14	23	12	124	190
	Ketul ((*Bidens Pilosa*)	2	0	2	1	0	1	6	
	Babadotan (*Geratum conyzoides*)	0	2	1	11	0	14	28	
	Krokot (*Partulaca oleracea*)	0	2	6	4	1	4	17	
	Sidaguri (*Sula rhombifolia L.*)	3	6	4	0	0	2	15	
	Rumput Belulang	16	10	8	22	20	14	90	

	(*Eleusine indica L.*)								
J2	Rumput Israel (*Asystasia gangetica*)	14	13	15	5	4	13	64	115
	Sidaguri (*Sula rhombifolia L.*)	2	0	3	0	4	2	11	
	Babadotan (*Geratum conyzoides*)	6	6	10	7	1	10	40	
J3	Rumput Belulang (*Eleusine indica L.*)	12	10	3	6	1	2	34	135
	Ketul ((*Bidens Pilosa*)	2	1	3	3	1	0	10	
	Babadotan (*Geratum conyzoides*)	3	8	6	3	2	2	24	
	Sidaguri (*Sula rhombifolia L.*)	1	0	2	1	4	2	10	
	Rumput Israel (*Asystasia gangetica*)	4	9	18	0	22	4	57	
J4	Rumput Belulang (*Eleusine indica L.*)	22	9	12	8	2	11	64	171
	Ketul ((*Bidens Pilosa*)	1	0	3	1	5	2	12	
	Babadotan (*Geratum conyzoides*)	0	4	2	5	8	6	25	
	Krokot (*Partulaca oleracea*)	0	3	4	3	3	1	14	
	Sidaguri (*Sula rhombifolia L.*)	1	1	1	2	3	2	10	
	Rumput Israel (*Asystasia gangetica*)	8	12	2	8	12	4	46	
	Total	122	124	127	104	116	108	701	611

Table 4 shows that the highest number of weeds was in J1 and the lowest in J2. Wide spacing should result in more weeds than in dense spacing. This contradicts general theory, which suggests several factors, including climate and soil fertility. Soil fertility is a condition in which water, air, and nutrients are in sufficient balance and available to meet plant needs, encompassing the physical, chemical, and biological aspects of the soil (Lestari, 2018).

The abundance of weeds growing in these crops can be attributed to soil cultivation and fertilization. Dwimartina & Asad, (2025) explain that hoeing during soil cultivation can lift weed seeds to the soil surface. This seed bank can germinate into individual weeds at any time if supported by favorable environmental factors**.**

4. CONCLUSION

Based on the results of this study, it can be concluded that the combination of plant spacing significantly influenced weed suppression in red chili (Capsicum annuum L.) cultivation and also affected chili yield. Thus, plant spacing has great potential in both reducing weed growth and increasing red chili production. The lowest weed count was observed in the 50 x 60 cm spacing treatment. The highest fruit yield per plot was obtained at 30 x 60 cm spacing, while the lowest yield was recorded at 60 x 60 cm spacing. For future research, further studies on plant spacing are recommended to optimize weed suppression and enhance the growth and yield of red chili crops.

ACKNOWLEDGEMENTS

The author would like to thank Saint Thomas Catholic University Medan for their support and assistance in this research.

REFERENCES

Alam, M. M., Sadik, M. S., & Mamun, M. A. Al. (2023). Chilli production and adoption of chilli-based farming system in Bangladesh: A farm level analysis. *Journal of Agribusiness and Development Economics*, *5*(1), 57–72. https://doi.org/https://doi.org/10.1108/JADEE-11-2022-0066

Amir, N., Aminah, R. I. S., Paridawati, I., & Pratama, R. A. (2024). Pengaturan jarak tanam dan aplikasi mikoriza pada tanaman cabai merah (Capsicum annum L.). Klorofil, 19(1), 7–11.

https://doi.org/10.32502/jk.v19i1

Aminuddin, M. I. (2017). *Respon Pemberian Pupuk MKP dan Jarak Tanam Terhadap Pertumbuhan dan Produksi Cabai Rawit(Capsicum frustescensL.)*. *1*, 44–57. https://doi.org/https://doi.org/10.52166/agroteknologi.v1i1.643

Assagaf, S. A. (2017). Pengaruh Sistem Jarak Tanam Dan Pemberian Em-4 Terhadap Pertumbuhan Dan Produksi Tanaman Cabai Rawit (Carpsicumfrutescens L.). *Agrikan: Jurnal Agribisnis Perikanan*, *10*(2), 65. https://doi.org/10.29239/j.agrikan.10.2.65-79

Devi Rizqi Nurfalach. (2010). *Budidaya Tanaman Cabai Merah (Capsium annum L.) Di UPTD Perbibitan Tanaman Hortikultura Desa Pakopen Kecamatan Bandungan Kabupaten Semarang*. Universitas Sebelas Maret.

Dwimartina, F., & Asad, F. Al. (2025). Identifikasi Keanekaragaman dan Dominansi Gulma Pada Lahan Pertanaman Mangga Gedong Gincu di Desa Lohbener Indramayu. *Agro Wiralodra*, *8*(1), 12–17. https://doi.org/10.31943/agrowiralodra.v8i1.138

Erni Suryani. (2022). Pengaruh Jarak Tanam Dan Dosis Pupuk Kandang Terhadap Pertumbuhan Tanaman Cabai Rawit (Capsicum frutescens). *JUSTER : Jurnal Sains Dan Terapan*, *1*(2), 21–26.

Haryono, D., Sabiela, I., Riantini, M., Tambunan, V. P., & Firdasari. (2025). Price fluctuations of curly red Chilli and their effects on farmers' welfare in Pringsewu regency, Lampung: The influence of government policy and household income. *Edelweiss Applied Science and Technology*, *9*(4), 1399–1412. https://doi.org/10.55214/25768484.v9i4.6303

Imaniasita, V., Liana, T., & Pamungkas, D. S. (2020). Identifikasi Keragaman dan Dominansi Gulma pada Lahan Pertanaman Kedelai. *Agrotechnology Research Journal*, *4*(1), 11–16. https://doi.org/10.20961/agrotechresj.v4i1.36449

Lestari, N. A. (2018). Identifikasi Jenis Dan Analisis Vegetasi Tanaman Liar (Gulma) Pada Tanaman Ubi Jalar (Ipomea batatas L). *Jurnal Agriovet*, *1*(1), 109–120. http://www.ejournal.kahuripan.ac.id/index.php/agriovet/article/view/185

Mattalitti, M. I., Hos, J., Moita, S., Upe, A., & Charles, N. (2024). Sustainable Agriculture Development and Food Security : A Systematic Review. *International Hybrid Conference on Revitalizing Global Economy for Sustainable National Development (IHCRGESND), Nigeria Sustainable*, *3*, 158–170. https://ojs.literacyinstitute.org/index.php/iacseries/article/view/1528/512

Nanda Firdaus , Yustitia Akbar, Y. S. (2021). *Pertumbuhan Dan Hasil Tanaman Cabai (Capsicum Annum L.) Akibat Pemberian Beberapa Dosis Pupuk Organik Cair Keong Mas (Pomacea canaliculata L.)*. *cm*, 6.

Prabowo, S. M., Dewi, S. A., & Hatmini, D. (2020). Identification of local seeds bank weed and the effect of weeding frequency on growth and results of cayenne (Capsicum frutescens). *Agric*, *32*(2), 121–128. https://doi.org/10.24246/agric.2020.v32.i2.p121-128

Pratiwi, N., Koesriharti, & Maghfoer, M. D. (2014). Pemanfaatan Tepi Bedengan Tanaman Tomat (Lycopersicon esculentum Mill.) dengan Berbagai Tanaman Sela dalam Upaya Peningkatan Produktivitas Lahan. *Jurnal Produksi Tanaman*, *2*(1), 50–58. Pemanfaatan tepi bedengan tanaman tomat (Lycopersicon esculentum mill.) dengan berbagai tanaman sela dalam upaya peningkatan produktivitas lahan | produksi tanaman

Puji, H. K., Deasy, A., & Ismi, R. (2022). Preserving the Sustainability of Natural Resources and Agro-Ecosystems in Tidal Swampland Through Local Wisdom in Indonesia. *Journal of Sustainability Science and Management*, *17*(5), 2672–7226. https://doi.org/10.46754/jssm.2022.05.006

Sapto Priyadi, & H. Haryuni. (2025). Biofortification in Palm Oil Based on Saponin Nanotechnology Innovation in Nutritional Stability, Antioxidants and for Functional Quality. *Agricultural Science*, *8*(2), 112–134. https://doi.org/10.55173/agriscience.v8i2.157

Sedana, G. (2020). Benefits of farmers' cooperative to rice farming activity: Case of Subak's cooperative in Guama, Tabanan District, Bali province. *IOP Conference Series: Earth and Environmental Science*, *484*(1). https://doi.org/10.1088/1755-1315/484/1/012134

Suryatini, L. (2018). Analisis keragaman dan komposisi gulma pada tanaman padi sawah (studi kasus Subak Tegal Kelurahan Paket Agung Kecamatan Buleleng). *Sains Dan Teknologi*, *7*(1), 77–89. DOI:10.23887/jst-undiksha.v7i1.10395

Tangoi, D., Pembengo, W., & Dude, S. (2018). Respon Pertumbuhan dan Produksi Tanaman Cabai (Capsicum frutescens L.) Pada Jarak Tanam yang Berbeda Dan Waktu Aplikasi Pupuk Phonska. *JATT*, *8*(2), 254–261. https://repository.ung.ac.id/get/karyailmiah/4745/Respon-Pertumbuhan-dan-Produksi-Tanaman-Cabai-Capsicum-frutescent-L-pada-Jarak-Tanam-yang-Berbeda-dan-Waktu-Aplikasi-Pupuk-Phonska.pdf

Tani, T. B. K. (2011). *Buku Pedoman Bertanam Cabai*. https://yrama-widya.co.id/shop/agrikultur/hortikultural/buku-pedoman-bertanam-cabai/

Utara, B. P. S. (2020). Provinsi Sumatera Utara Dalam Angka 2020 Sumatera Utara Province in Figures 2020. *Proceedings of the National Academy of Sciences*, *1*. http://dx.doi.org/10.1016/j.bpj.2015.06.056%0Ahttps://academic.oup.com/bioinformatics/article-abstract/34/13/2201/4852827%0Ainternal-pdf://semisupervised-3254828305/semisupervised.ppt%0Ahttp://dx.doi.org/10.1016/j.str.2013.02.005%0Ahttp://dx.doi.org/10.10

Vera, D. Y. S., Turmudi, E., & Suprijono, E. (2020). Pengaruh jarak tanam dan frekuensi penyiangan terhadap pertumbuhan, hasil kacang tanaH (Arachis hypogaea L) DAN POPULASI GULMA. *Jurnal Ilmu-Ilmu Pertanian Indonesia*, *22*(1), 16–22. https://doi.org/10.31186/jipi.22.1.16-22