Sri Utami | Suwardi | Dafni Mawar Tarigan
Rini Sulistiani | Wahyuni Umami | Efrida Lubis
Risnawati

Agrotechnology:

Sorghum, Corn, Moringa, and Rice Plantations



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Editor :
Bunga Raya Ketaren
Anggria Lestami

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Penulis : Sri Utami, Suwardi, Dafni Mawar Tarigan, Rini Sulistiani, Wahyuni Umami, [dan 2 lainnya]
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Jl. Kaliurang Km. 9,3 – Yogyakarta 55581
Phone/Fax : (0274) 4533427
Website : www.penerbitdeepublish.com
www.deepublishstore.com
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FOREWORD

Our foremost and utmost gratitude to God The Almighty, for His abundant grace that allowed us, Deepublish Publisher to publish this book entitled ***Agrotechnology*: *Sorghum, Corn, Moringa, and Rice Plantations***. This book reveals relevant topics in the agrotechnology field. This book discusses the increase of sorghum production using potassium chloride and goat urine; hybrid corn production on a dry land; sorghum growth and production in acid soil; moringa oleifera (treatment of planting media and nitrogen); rice planting (the effect of inundation period and straw mulch dose); trapping height and pineapple weight to *Oryctes rhinoceros*; as well as increasing sorghum growth and production on marginal land organically.

As a publisher that–above other missions–prioritizes its role to educate and glorify mankind, as well as to utilize science and technology to its best, we do not only attend to the work of established writers, but we provide the room and facility for people who wish to express their creativity and innovation in writing and conveying ideas and values.

Our warmest gratitude and appreciation to the authors who have given us trust and contribution to the perfection of this book. Hopefully, this book is useful, and educative, and contributes well in glorifying mankind and the utilization of science and technology in the country.

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Rice Planting: The Effect of Inundation Period and Straw Mulch Dose

Wahyuni Umami, Wizni Fadhillah and Nurhajijah
Editor : Bunga Raya Ketaren and Anggria Lestami

Abstract. Rice planting with rice intensification system to improve results by comparing direct seed sowing method and conventional method. However, it is constrained by very high weed attacks. These conditions require control technology that can reduce weed populations. One technology that can be used is inundating the land before planting and using straw mulch. This technology still needs research to see its effect on rice yields with a factorial randomized block design. The first treatment was long inundation was 3, 6, 9, 12, and 15 days. The second treatment was the dose of straw mulch is 2, 2, 4, and 6 tons/ha. The data is presented in a graphical form showing the regression of each treatment on rice yields. Based on the research, it can be seen that the inundation period was 15 days and the dose of straw mulch was 6 tons/ha.
Keywords: Inundation Period, Straw Mulch, System Rice Intensification, Yield

1. System of Rice Intensification and Weed Problems

The SRI method, which stands for System of Rice Intensification, is a planting pattern that can potentially increase rice production. Rice has faster growth because the development of young roots is faster so plant nutrient absorption is more optimal. The use of a single seed will avoid competition between plants thereby allowing the plants to grow

quickly, maximize the production of offspring and increase rice production. However, the use of SRI has problems with high weed attacks.

Weeds cause yield loss due to (1) their role as host plants, such as *Cynodon dactylon*, which is a host for rice cantilever pests. (2) blockage of drainage channels resulting in inefficient water management, for example, *Eichornia crassipes*. (3) reducing crop quality. (4) compete with plants for light, water, nutrients, and other growth needs. (5) disrupting the smooth operation of farmers, for example, thorny weeds such as Amaranthus spinosus, *Mimosa invisa*, and (6) reducing the quality and quantity of crop yields. Yield losses depend on weed species and density, soil type, water supply, and climatic conditions (Nantasomsaran and Moody, 1993).

Based on weed research data conducted by Atralina (2012) weed control time greatly affects yield loss in rice plants. This indicates the presence of critical phases of plants against weed competition. If rice is left in a weed state for one growing season, only 4 panicles will be obtained per hill with an empty grain percentage of 99.29%. Rice that was allowed to weed until 63 HST had 7 panicles with an empty grain percentage of 99.29%. While the highest number of panicles is obtained if the rice is clean from weeds until the age of 42days after planting and net rice from weeds to harvest, namely 34.33 panicles with empty grain percentages of 22.74% and 24.15%, which statistically the two treatments showed no significantly different effect. The same result was also obtained by Jamilah (2013) that rice left to weed until the age of 60days after planting will cause high yield loss, namely the weight of the grain is only 3.79 kg/plot but statistically it is not significantly different from weed rice until the age of 40days after planting whose grain weight is 4.89 kg/plot. Meanwhile, if only weed until the age of 20 days after planting then the weight of grain per plot obtained is 5.06 kg.

Technologies that can be used to overcome weed problems are flooding the land before planting and using straw mulch. Flooding of the land aims to inhibit the germination of planting material and kill weeds that grow on cultivated land. While the use of straw mulch will reduce

weed germination. Reducing the number of weeds will increase the yield of rice plants.

2. Identifying Inundation Period and Straw Mulch Dose

The design used in this study was a split plot in a randomized block design environment. Environmental grouping was carried out based on differences in planting areas and was made into 4 groups. The main plot was the length of inundation before planting consisting of 5 levels, namely 3 days, 6 days, 9 days, 12 days, and 15 days. Subplots were rice straw mulch doses consisting of 4 levels, namely 0 tons/ha, 2 tons/ha, 4 tons/ha, and 6 tons/ha. All experimental units consisted of 80 units, each experimental unit consisting of 1 paddy field so that 80 experimental units were obtained. Each plot consisted of 80 rice clumps and 18 clumps used observation of harvest plots. The variables observed in this study are weed biomass, the number of productive tillers, the percentage of empty grains per panicle, and the percentage of rice grains per panicle. Observation data is presented in graphical form by presenting the regression of each treatment on the observed variables.

3. Exploring the Effect of Inundation Period and Straw Mulch Dose

Weed Biomass

Figure 1 shows that the duration of inundation of the land 3 days before planting with a dose of 0 ton/ha of rice straw mulch had the highest weed biomass. Weed biomass became less with each increase in the length of land immersion before planting and the dose of rice straw mulch.

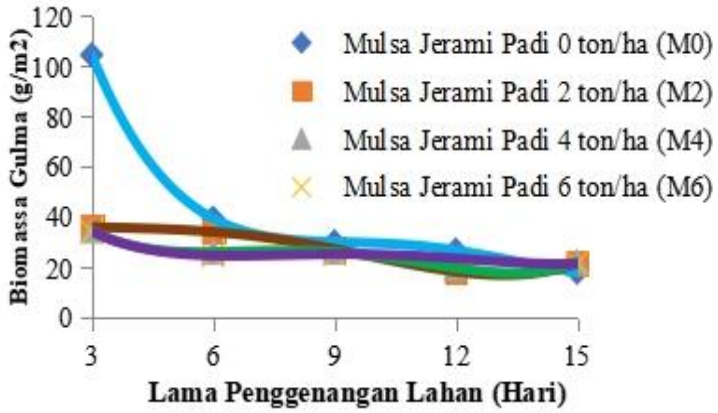


Figure 1. Effect on Weed Biomass

M0 y = 312.7 - 318.5x + 132.8x2 - 24.12x3 + 1,587x4
R^2 = 0.919
M2 y = 42.86 - 14.99x + 12.46x2 - 4.552x3 + 0.498x4
R^2 = 0.969
M4 y = 95.67 - 109.4x + 61.94x2 - 14.75x3 + 1.231x4
R^2 = 0.709
M6 y = 80.45 - 76.90x + 38.17x2 - 8.004x3 + 0.595x4
R^2 = 0.727

The addition of long inundation of land with a dose of rice straw mulch has a strong relationship to weed biomass at a dose of 0 ton/ha as evidenced by a coefficient value of 0.959, a coefficient value of 0.984 at a dose of 2 tons/ha rice straw mulch, a coefficient value of 0.842 at a dose 4 tons/ha of rice straw mulch and a coefficient of 0.853 at a dose of 6 tons/ha of rice straw mulch. Weed biomass on land without flooding with straw mulch dose of 0 ton/ha was 312.7 g, straw mulch dose of 2 ton/ha was 42.86 g, straw mulch dose of 4 ton/ha was 95.67 g and straw mulch dose of 6 ton/ha was 80.45 g. This is due to the long inundation of the land 3 days before planting with a dose of rice straw mulch of 0 ton/ha there was *Cyperus rotundus* weed with a value summed dominance ratio (SDR)the highest. One of the factors that

greatly influence the SDR value of weeds is the biomass of the weeds themselves so the greater the biomass, the higher the SDR value of the weeds in that treatment. Another thing that can be illustrated by the SDR value is the level of mastery of these weeds over the biotic and abiotic factors present in the land. According to Holom et al., (1970) *Cyperus rotundus* is one of the worst weeds in the world. This is because these weeds do not die when getting inundated, can grow well in moist SRI soil conditions, and reproduce very quickly and a lot.

Meanwhile, flooding of the land for more than 3 days before planting with straw mulch at 2-6 tons/ha causes weed seeds to die. If the number of weeds that grow is small and the growth of weeds that germinate is disturbed, it will produce relatively lower biomass. According to Estioko et al., (2014) stagnant conditions cause the oxygen content to become less available for the propagation material to carry out aerobic respiration so that anaerobic respiration will be carried out by the weed propagation material. But the longer the inundation and the longer the weed propagation material is in conditions of anaerobic respiration which causes the depletion of food reserves before germination occurs. This is because anaerobic respiration produces less energy for every use of 1 mol of glucose, namely 2 ATP. In addition, the process of anaerobic respiration also produces other toxic compounds, causing the death of the embryo.

The decrease in weed biomass also occurs due to the content of allelochemical compounds found in rice straw mulch. According to Chung et al., (2001) rice plants contain phenolic compounds 4-hydroxybenzoic, 4-hydroxyhydroxynamic, and 3,4-dihydroxyhydroxynamic acids. Mahayaning et al., (2015) stated that the phenolic content in rice straw was 223 mg Equivalent Acid Error (GAE)/100 mg extract. Phenolics can suppress weed germination and growth by interfering with cell membrane permeability, inhibiting the activation of hydrolytic enzymes which play a role in breaking down food reserves and increasing the size and number of cells.

Biomassa weed mass has a negative correlation with all observed variables except for the percentage of empty grain. The negative

correlation indicates that a decrease in weed biomass will increase the value of the other observed variables, but a decrease in weed biomass will decrease the percentage of empty grain. Weed biomass has a strong correlation to plant height, net assimilation rate, relative growth rate, number of grains per panicle, percentage of empty grain, grain weight per clump, and production per ha but has a fairly strong correlation to root biomass, leaf area index, biomass title and number of offspring. According to Moenandir (1993), weed biomass is strongly influenced by the ability of competition between weeds and plants. The higher the weed biomass, the higher its competitive ability compared to plants so is an emphasis on plant growth.

Number of Productive Tillers

Based on Fig. 2, it can be seen that the addition of the duration of land inundation has a strong relationship with the dose of rice straw mulch. This is evidenced by the correlation coefficient of 0.916 at a dose of rice straw mulch of 0 ton/ha, 0.698 at a dose of rice straw mulch of 2 tons/ha, 0.979 doses of rice straw mulch of 4 tons/ha and 0.985 doses of rice straw mulch of 6 tons/ha.

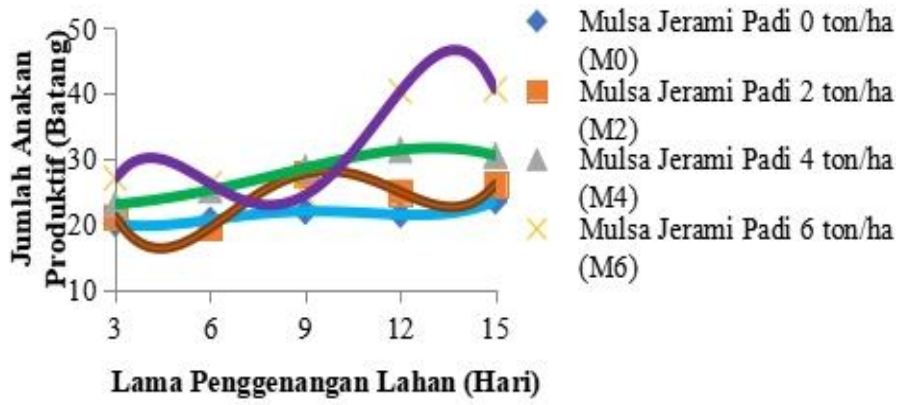


Figure 2. Effect on the Number of Productive Tillers of Rice Plants

M0 y = 30.00 - 20.11x + 13.25x2 - 3.357x3 + 0.292x4
R^2 = 0.839
M2 y = 90.21 - 131.1x + 79.12x2 - 18.66x3 + 1.513x4
R^2 = 0.487
M4 y = 22.82 - 0.797x + 0.871x2 + 0.150x3 - 0.046x4
R^2 = 0.958
M6 y = 43.37 + 142.3x - 94.47x2 + 24.65x3 -2.156x4
R^2 = 0.971

Figure 2 also showed that at a dose of rice straw mulch of 6 tons/ha with a duration of inundation of the land 9 days before planting the number of productive tillers decreased. This may be due to the high SDR value of weeds *Asistasia gangetica* i.e. 10%.

According to Aldi (2014) weeds*, Asistasia gangetica* is capable of producing allelochemical compounds of the type of flavonoids, alkaloids, tannins, and steroids. The percentage of flavonoid content found in this weed is 4 – 8%. Flavonoids are allelochemical compounds that inhibit the process of mitosis by damaging the spindle threads in the cell at the metaphase stage so that cell division becomes inhibited. If cell division is inhibited, panicle formation will also be inhibited.

The results of Einhelig's (1994) research also show that flavonoids can damage the structure of the cell wall and also the organelles in the cell thereby slowing down the metabolism in the formation of food reserves. If the process of forming food reserves is hampered, rice plants have a low ability to form rice grains so the number of productive tillers becomes even lower.

Percentage of Empty Grain per Panicle

Figure 3 showed that the addition of the length of inundation before planting with rice straw mulch doses had a strong relationship, as evidenced by the correlation coefficient value of 0.976 at a rice straw mulch dose of 0 ton/ha. The correlation coefficient on rice straw mulch dose of 2 tons/ha is 0.897. The correlation coefficient at the dose of rice

straw mulch 4 ton/ha is 0.986. The correlation coefficient at the dose of rice straw mulch 6 ton/ha is 0.731.

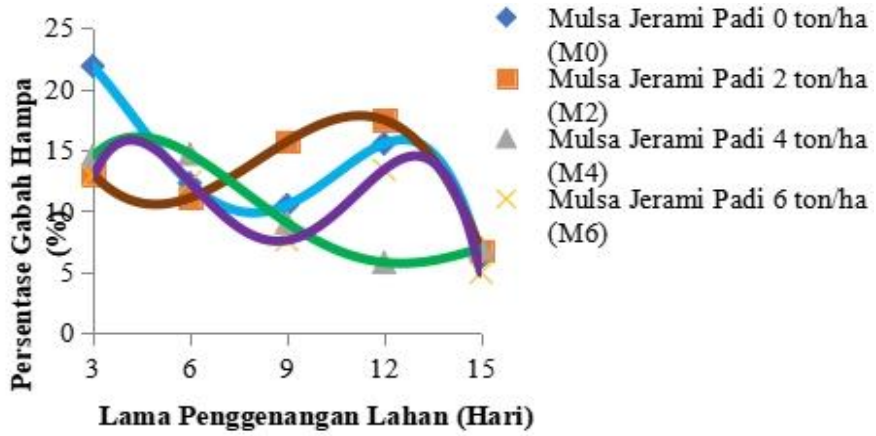


Figure 3. Effect on the Percentage of Empty Grain of Rice Plants

M0 y = 19.91 + 19.28x - 24.75x2 + 8.295x3 - 0.845x4
R^2 = 0.988
M2 y = 30.49 - 28.12x + 12.08x2 - 1.404x3 - 0.015x4
R^2 = 0.947
M4 y = 5.82 + 36.75x - 20.08x2 + 3.933x3 - 0.256x4
R^2 = 0.998
M6 y = 45.35 + 115.7x - 74.79x2 + 18.99x3 -1.651x4
R^2 = 0.855

This shows that rice plants may have the ability to produce a lot of grain, but not all grain can be filled with assimilates. If the availability of assimilate is low, a lot of grain at the bottom of the panicle becomes empty. In addition, the conditions of higher weed competition in the long-flooding 3 treatment with a straw mulch dose of 0 ton/ha resulted in rice plants having low assimilation.

If related to weed SDR, the presence of *Cyperus rotundus* L. greatly affects the percentage of empty grain in rice plants. The higher the SDR value of *Cyperus rotundus* L., the higher the percentage of empty grain.

Cyperus rotundus L weed is a weed that has high efficiency because when the light intensity increases, CO2 uptake also increases. According to Moenandir (1993), the presence of weeds around rice plants causes competition for carbon dioxide. The ability of a plant to compete with weeds depends on the plant's ability to assimilate CO2 and use photosynthesis to increase leaf size. A weed that binds CO2 at a high rate has an early advantage so that it has the opportunity to dominate the growing area.

According to Junaedi et al., (2006) the competitive ability of weeds is also strongly influenced by the ability to secrete allelochemicals. The allelochemical compound owned by *Cyperus rotundus* L. is tannin. Tannins are allelochemicals that are easily hydrolyzed and are capable of inhibiting seed germination, inhibiting the performance of nitrifying bacteria in nitrogen fixation. If the nitrification process is hampered, the amount of nitrogen that can be absorbed by plants will also be small so that the metabolism in the body of rice plants also becomes not optimal.

Nasution et al., (2013) also stated that the higher the level of competition between weeds and rice plants, the higher the percentage of empty grain. According to Antralina (2012) cultivating rice without weed control was able to reduce the number of rice grains and increase empty grain to 99.29% per panicle. Meanwhile, according to Devasinghe et al., (2013), the percentage of empty grains in rice plants without weed control is 61.06% but if using rice straw mulch as a weed control measure it has a percentage of the empty grain of 1.08%.

Another factor that affects the percentage of empty grain per panicle is weed biomass. Reducing weed biomass will reduce the percentage of empty grains per panicle. The percentage of empty grain per panicle has a strong correlation with weed biomass.

Percentage of Healthy Grain per Panicle

Figure 4 showed that the duration of inundation of the land before planting with the dose of rice straw mulch to the percentage of rice grain had a relationship that was not too strong because it had a

correlation coefficient of 0.663 at a dose of 0 ton/ha of rice straw mulch. The correlation coefficient on rice straw mulch dose of 2 tons/ha is 0.524. The correlation coefficient at the dose of rice straw mulch 4 ton/ha is 0.437. The correlation coefficient at the dose of rice straw mulch 6 ton/ha is 0.230. The lowest percentage of grain with good quality was obtained when the land was inundated 3 days before planting with a straw mulch dose of 0 ton/ha.

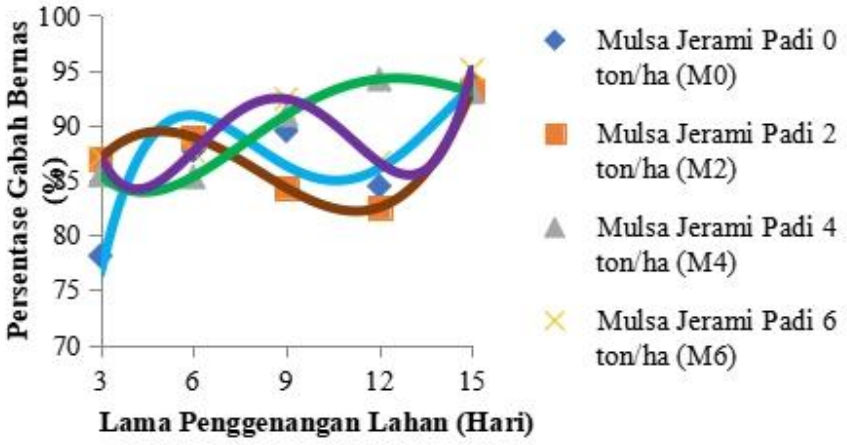


Figure 4. Effect on the Percentage of Healthy Grain in Rice Plants

M0 y = 80.09 - 19.28x + 24.75x2 - 8.295x3 + 0.845x4
R^2 = 0.814
M2 y = 69.51 + 28.12x - 12.08x2 + 1.404x3 +0.015x4
R^2 = 0.724
M4 y = 0.256x4 - 3.933x3 + 20.08x2 - 36.75x + 105.8
R^2 = 0.661
M6 y = 1.651x4 - 18.99x3 + 74.79x2 - 115.7x + 145.3
R^2 = 0.480

The percentage of full grain is inversely proportional to the percentage of empty grain. Rice that has a low percentage of empty grain has a high percentage of full grain. If related to other variables, the percentage of the rice grain is also strongly influenced by weed

biomass, net assimilation rate (LAB), relative growth rate (LTR), and the number of grains per panicle. Low weed biomass indicates superior plant competitiveness compared to weeds. According to Jamilah (2013) plants can fill grain well if their nutrient, water, and sunlight needs are met properly.

According to Lita et al., (2013) LAB and LTR are parameters to see the increase in rice plant biomass. Photosynthate will be accumulated in the parts of the plant that need it. Photosynthesis is mostly accumulated towards the vegetative organs, namely leaves and stems during the vegetative phase, while for the generative phase it will be accumulated in the generative parts of plants such as grain. Plants that have a high LAB and LTR will have a high percentage of full grain.

Conclusion

Based on the research that has been done, it is known that the long duration of inundation can suppress weed biomass and increase the yield of rice plants.

REFERENCES

Aldi, A. 2014. Karakteristik Ekstrak Etanol Tanaman Rumput Israel (Asistasia gangetica) dari Tiga Tempat Tumbuh di Indonesia. Skripsi. UIN Syarif Hidayatullah. Jakarta. 114 Hal.

Antralina, M. 2012. Karakteristik Gulma dan Komponen Hasil Tanaman Padi Sawah (Oryza sativa l.) Sistem SRI pada Waktu Keberadaan Gulma yang Berbeda. *J. Agri dan Pengem Wilayah*. 3(2).

Chung, M. J, Ahn dan Y, Yun. 2001. Identification of allelopathic compounds from rice (Oryza sativa L.) straw and their biological activity. *J. Crop Sci*. 45. 815 – 819.

Devasinghe, D. Premaratne dan Sangakkara. 2013. Impact of Rice Straw Mulch on Growth, Yield Components and Yield of Direct Seeded Lowland Rice (Oryza sativa L.). *J. Tropic Agro*. 24 (4). 325 – 335.

Einhelig, F.A. 1994. Allelopathy: Organisms, Processes, and Applications. *Chem. Ecol*. 19. 2231-224.

Estioko, L. M, Berta. M, Aurora. E, Florinia. A, Ismail dan E, David. 2014. Differences in Responses to Flooding by Germinating Seeds of Two Contrasting Rice Cultivars and Two Species of Economically Important Grass Weeds. *Plants Sciense*. 1- 15.

Holom, L. L, Donald. V, Juan dan P, James. 1977. *The World's Worst Weed Distribution and Biology*. University Press of Hawaii. Honolulu. 609 Hal.

Jamilah. 2013. Pengaruh Penyiangan Gulma dan Sistim Tanam terhadap Pertumbuhan dan Hasil Tanaman padi Sawah (Oryza sativa L). *J. Agrista*. 17 (1).

Junaedi, A. A, Muhammad. dan K, Kim. Perkembangan Terkini Kajian Alelopati. *J. Hayati*. 13 (2). 79 – 84.

Lita, S. S, Sukartomo dan B, Guritno. 2013. Pengaruh Perbedaan Sistem Tanam terhadap Pertumbuhan dan Hasil Tanaman Padi (Oryza sativa l.) di Lahan Sawah. *J. ProdTan*. 1(4).

Moenandir, J. 1993. *Persaingan Tanaman Budidaya dengan Gulma (Ilmu Gulma III)*. Raja Grafindo Persada. Jakarta. 100 Hal

Nantasomsaran, P. Moody. 1993. Weed Management for Rainfed Low Land Rice. *J. Agro.* 1(4). 10 – 13.

Nasution, F. G, Jonathan. dan S, Balonggu. 2013. Tanggap Pertumbuhan dan Produksi Padi Gogo Varietas Situ Bagendit terhadap Pengolahan Tanah dan Frekuensi Penyiangan yang Berbeda. *J. Agroeko*. 1(2). 24 – 36.

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