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Soybean *(Glycine max (*L.*)* Merr.*)* Varities Selection for the Trait of Tolerant to Nutsedge *(Cyperus rotundus (*L.*))* Weed Competition

Andy Soegianto

Plant Breeding Laboratory, Agronomy Department, Fac. of Agriculture, University of Brawijaya, Malang, Indonesia

ABSTRACT

This research aimed to get soybean varieties having tolerance to purple nutsedge competition by doing a test of competitive level of soybean to various initial purple nutsedge populations. This research was done in the screen house of Faculty of Agriculture, Brawijaya University in Malang with the altitude of 505 asl and was done from February to June2009. The experiment was arranged on Randomized Block Design Factorial with three replications. The first factor was the varieties of soybeans, consisted of 5 varieties: Anjasmoro, Argomulyo, Burangrang, Cikuray, and Kaba. The second factor was the initial population of purple nutsedge consisted of 4 levels: 0, 3, 6, and 9 tuber/polybag. Fertilizer application per polybag was 0.25 g of Urea; 0.25 g of KCl; 0.188 g of SP-36. Pesticides were applied every week began at 6 days after planting (dap) until 2 weeks prior to harvest. Agronomic characters were measured at interval of 2 weeks starting at 15 dap until 57 dap, while yield and yield components were measured at harvest time (90 dap). The result showed that the initial purple nutsedge population of three tubers started to decrease soybean yield. Cikuray varieties had the higher relative yield in every treatment of purple nutsedge population except for the total plant dry weight character.

KEYWORDS: soybean varieties, tolerance, yield loss, purple nutsedge, weed competition.

INTRODUCTION

Soybean is an agricultural commodity that has strategic value for Indonesia because of the importance of soybeans in the composition of foods, namely as a cheap source of protein. More than a million farmers depend on the source of life income from soybeans. Soybean is a vegetable protein-producing plant that is consumed in large quantities. Indonesian soybean consumption in 2002 amounted to 2.24 million tons. While the national soybean production in 2002 only amounted to 652 800 tons [1], so as to meet the needs of Indonesia has to import soybeans from other countries.

One of the problems that cause low soybean production is the presence of weeds. Moenandir *et.al* [2] suggests that the presence of weeds around soybean plants can reduce soybean production of about 30-50%. *Cynodon dactylon*, *Cyperus rotundus*, *Imperata cylindrica*, *Paspalum conjugatum*, *Digitaria* sp., and *Amaranthus* sp. is weed species found on soybean plants (Moenandir *et al* [2]. Soybean yield losses due to competition with weeds is caused by the competition in terms of gaining light, nutrients, water, and the existence of an event called Allelopathic. One of the dominant weeds in soybean crop is the nutsedge. Sutarto and Bangun [3], noted that there is a barrier formation of effective root nodules of peanut plants due to the nutsedge competition. Allelopathic nutsedge weed (presumably phenolic compounds) can poison the natural rhizobium and nodules filaments in the soil [4]. The nutsedge ability in the population of 10 plants is capable to reduce peanut yield of up to 53.14%.

The effort has been carried out to maintain the yield losses due to weed competition conducted by the farmer are mechanically by hand and use of herbicides. This research is expected to get soybean varieties that are resistant to competition with weeds, so large yield losses can be avoided if they are grown on field with minimum cultivation.

This study aims to obtain tolerant soybean varieties to weed competition and to know the level of the nutsedge population that begin to cause a decrease in soybean results.

MATERIALS AND METHODS

This research was carried out in the experimental field of Faculty of Agriculture, University of Brawijaya, Malang, at an altitude of 505 m asl and conducted in February-June 2009.

The materials used in this study were five soybean genotypes consisting of varieties of Anjasmoro, Argomulyo, Burangrang, Cikuray, and Kaba and nutsedge tubers.

This research was arranged in a randomized block factorial design with three replications. The first factor was five varieties of soybean: Anjasmoro, Argomulyo, Burangrang, Cikuray, and Kaba. The second factor was the level of different populations of the nutsedge, namely 0, 3, 6, and 9 tubers per polybag.

Planting media was a thoroughly mixture of soil and manure with a ratio of 2:1 which then put in polybags. Each genotype of the five genotypes tested were planted in separate polybag. Two seeds per variety were planted in each

***Corresponding Author:** Andy Soegianto, Plant Breeding Laboratory, Agronomy Department, Fac. of Agriculture, University of Brawijaya, Malang, Indonesia. Email: a.soegianto@ub.ac.id

polybag. After one week, soybean seedlings were thinned to one seedling per polybag. Each treatment consisted of three polybags as the number of replications. The nutsedge tubers were planted at the time of soybean planting in accordance with the treatment of 0, 3, 6, and 9 tubers per polybag.

Observations on soybean plants were done on several characters, namely:

1. Plant height, measured from ground surface to the growing point
2. The number of branches, calculated the number of primary branches and secondary branches
3. The number of leaves, calculated the number of trifoliat leaves
4. Total flowers, calculated the amount of flowers that have been blooming
5. The number of pods, counted the number of pods formed in a single plant
6. Flowering, a time when 50% flowering plants appeared
7. Weight of 100 seeds, weighing 100 seeds of soybean plants
8. Seed weight per plant, weighing all seeds per plant
9. Total plant dry weight

Observations on the nutsedge were carried out on several characters as follows:

1. Nutsedge plant fresh weight, weighed all part plant of nutsedge freshly
2. Tiller number of nutsedge, observe the number of tiller in each of the nutsedge population
3. Nutsedge plant dry weight, weighed the dry weight of all nutsedge plant parts

Observations of soybean and nutsedge were conducted periodically, done on two-week-old plants after planting, then followed by further observations once a week at each component of plant growth. Solar radiation intensity were observed using lightmeter in the middle canopy of soybean plants at the age of 37 and 67 dap.

The data obtained were analyzed using analysis of variance (F test) on the 5% significancy level. To determine the best treatment, mean value was tested by comparing it using Least Significant Difference test (LSD) on the 5% significancy level.

To determine the tolerance level of soybean to competition with nutsedge, it will be calculated from the relative percentage decrease in the results according to Alexieva and Stoimenova [5], to the yield character that are influenced by the initial nutsedge tuber population treatment. Regression analysis was done to determine the form of the relationship between the observed characters of soybean and the treatment of initial nutsedge tuber population.

RESULTS

A. Growth of Soybean (*Glycine max* L.(Merr.)

In the observation of the age of 90 days after planting (dap), there was interaction between variety and population of weed on plant. Burangrang variety had a significantly lower height than the Anjasmoro variety, though it was not different to the three other varieties. While the variety which had a significantly higher height were Anjasmoro as a result of interaction between variety and nutsedge population treatment although it was no different to Argomulyo and Cikuray varieties (Table 2).

Table 2. Average plant height of soybean (cm) due to interaction of variety and initial nutsedge population at the age of 90 dap

Variety	Initial nutsedge tuber population			
	0	3	6	9
Anjasmoro	72.5 b	62.11 b	71.17 b	68.17 b
	B	A	AB	AB
Argomulyo	64.42 ab	62.22 b	55.56 a	52.33 a
	B	B	AB	A
Burangrang	55.22 a	50.33 a	62.83 ab	62.83 b
	AB	A	B	B
Cikuray	64.22 ab	65.44 b	64.05 ab	59.11 ab
	A	A	A	A
Kaba	61.50 a	59.11 ab	61.44 ab	63.22 b
	A	A	A	A
LSD 5 %				

Note: The value that was accompanied by the same lowercase letters in the same column and the same uppercase letters on the same line is not significantly different at 5% LSD

The regression analysis showed that the significantly interaction of variety and initial population of nutsedge tuber was occured only in Cikuray and Argomulyo varieties, with significant quadratic regression pattern in Cikuray variety and significant linear regression pattern in Argomulyo variety (Figure 1).

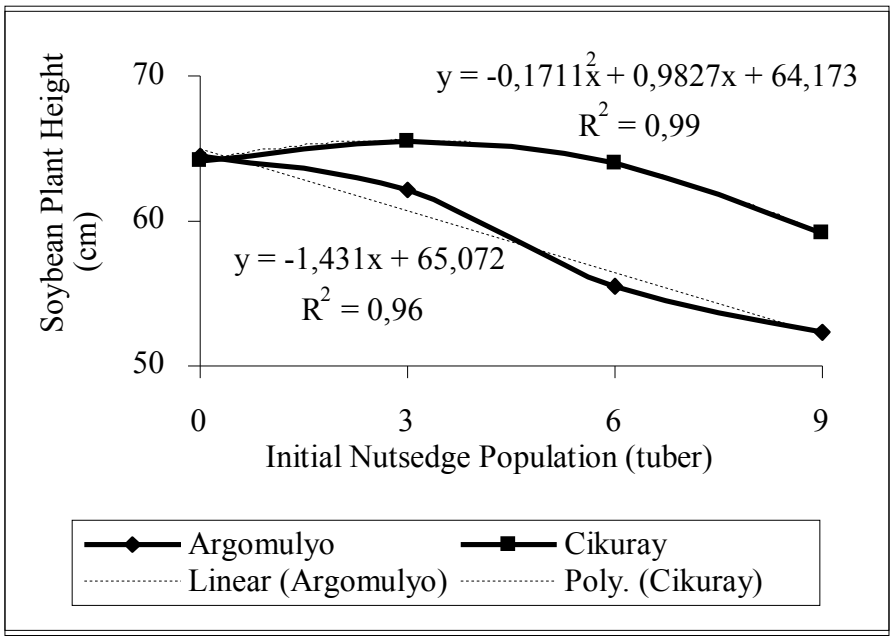

Figure1 Plant Height Graph of soybean (*G. max* L. (Merr.) of Argomulyo and Cikuray varieties at various initial nutsedge (*C. rotundus* L.) tuber population

The number of leaves was significantly influenced by the initial nutsedge tuber population treatment at the age of 90 dap observation, while the difference of varieties had no effect on the number of leaves variable on this observation.

Table 3. Average Leaves Number of Soybean due to Different Initial Nutsedge Tuber Population Treatment at 90 dap

Initial Nutsedge Population (tuber)	Soybean Leaves Number
0	37.76 b
3	31.62 ab
6	33.04 ab
9	26.09 a
LSD 5 %	S

Note: The value that was accompanied by the same letters in the same column is not significantly different at 5% LSD

Regression relationship between initial nutsedge tuber population and number of leaves of soybean plants showed significant linear regression pattern (Figure 2).

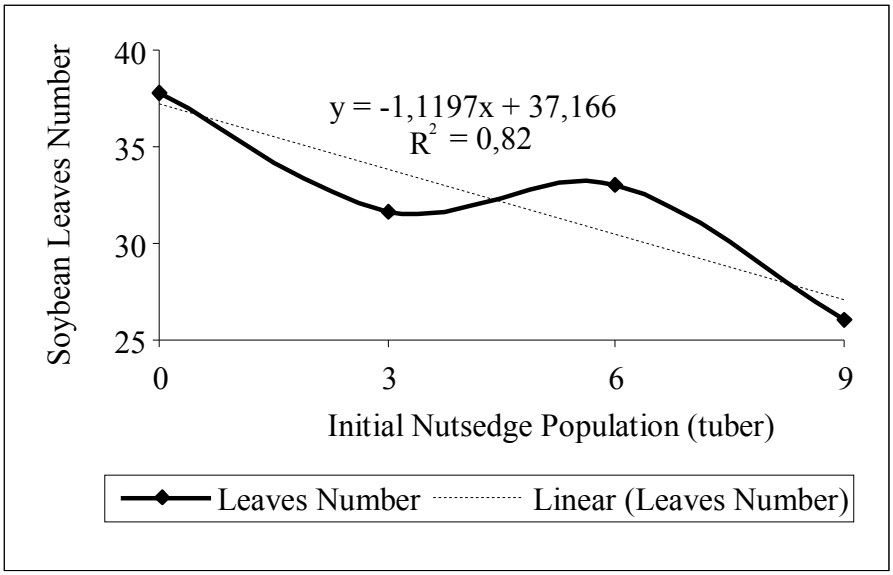

Figure 2. Graph of soybean (*G. max* L.(Merr.) leaves number on different initial nutsedge (*C. rotundus* L.) tuber population

Results of analysis of variance showed that there is no interaction between the initial nutsedge tuber population and soybean varieties to the number of soybean branch. However, each treatment of the initial nutsedge tuber population and soybean varieties showed a significantly influence on the number of branches observed on soybean age of 90 dap. Average number of soybean branches due to the influence of soybean varieties and weed populations are presented in Table 4.

Differences in soybean varieties caused significant differences in the number of branch on the age of 90 dap. Cikuray variety had significantly more branches than the Anjasmoro and Burangrang varieties, but not different number of branches to Kaba and Argomulyo varieties.

The number of branches of soybean was also influenced significantly by the treatment of initial nutsedge tuber population. Initial nutsedge tuber as much as six tubers had caused a decrease in the number of branches significantly as compared to treatment without nutsedge tuber (Table 4).

Based on regression analysis of the relationship between initial nutsedge tuber population and the number of soybean branches on 90 dap showed a significant negative linear relationship (Figure 3).

Table 4. Average number of soybean branches due to the different varieties of soybean and treatment of various initial nutsedge tuber populations on 90 dap

Variety	Soybean Branch Number
Anjasmoro	5.00 a
Argomulyo	5.33 ab
Burangrang	5.17 a
Cikuray	5.58 b
Kaba	5.33 ab
LSD 5 %	S
Initial Nutsedge Population (Tuber)	Soybean Branch Number
0	5.60 c
3	5.33 bc
6	5.20 ab
9	5.00 a
LSD 5 %	S

Note: The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

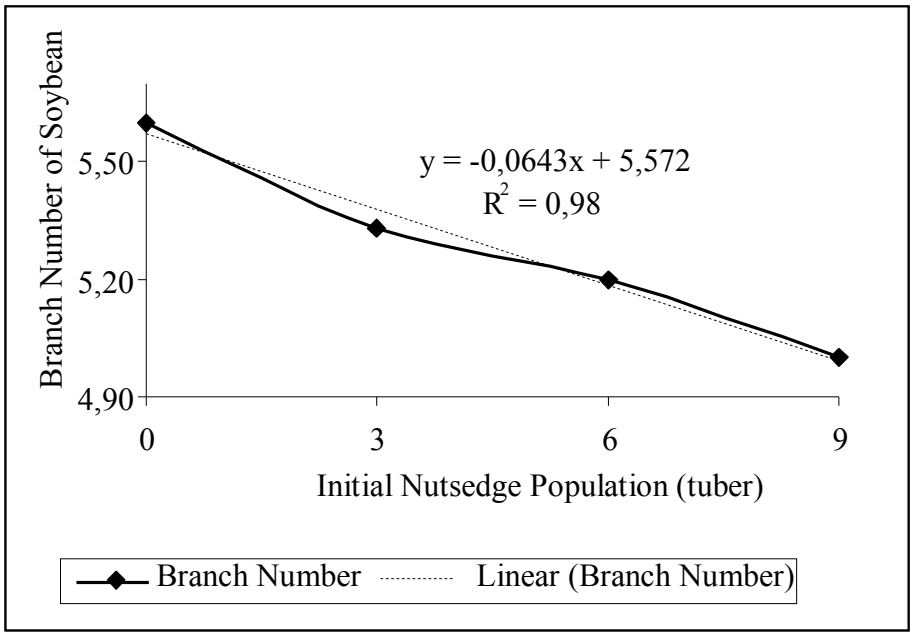

Figure 3. Graph of soybean (*G. max* L.(Merr.) branch number on different initial nutsedge (*C. rotundus* L.) tuber population

Results of analysis of variance showed that there is no interaction between the varieties and the initial nutsedge tuber population on soybean plant fresh weight at harvest. That was only the difference in varieties that gave significant influence on fresh weight of soybean plants. Average soybean plant fresh was weight due to the influence of soybean varieties are presented in Table 5.

Table 5. Average soybean plant fresh weight (g) of different varieties at harvest

Variety	Soybean Plant Fresh Weight (g)
Anjasmoro	102.91 bc
Argomulyo	102.93 bc
Burangrang	86.17 ab
Cikuray	114.38 c
Kaba	77.74 a
LSD 5 %	S

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

Based on Table 5 above, the Cikuray variety had the significantly higher fresh weight than Burangrang and Kaba varieties, and not significantly different to Anjasmoro and Argomulyo varieties.

Based on analysis of variance was known that there was no interaction between variety and level of the initial nutsedge tuber population on dry weight of soybean plant. However, each treatment provided a significant influence on this variable. Average soybean plant dry weight due to the different varieties and treatments of initial nutsedge tuber populations are presented in Table 6.

Table 6. Average of soybean plant dry weight (g) on different varieties and different initial nutsedge tuber population treatment

Variety	Soybean Plant Dry Weight (g)
Anjasmoro	28.52 ab
Argomulyo	34.59 bc
Burangrang	27.95 ab
Cikuray	43.41 c
Kaba	22.05 a
LSD 5 %	S
Initial Nutsedge Population (Tuber)	Soybean Plant Dry Weight (g)
0	38.28 c
3	33.77 bc
6	28.70 ab
9	24.47 a
LSD 5 %	S

Note: The value that was accompanied by the same letters in the same column is not significantly different at 5% LSD

Table 6 describes the Cikuray variety have a significantly higher plant dry weight than the varieties of Anjasmoro, Burangrang, and Kaba, but not different to the Argomulyo variety. Treatment of the initial nutsedge tuber population of 6 tubers has caused the dry weight of soybean plants significantly lower than those without nutsedge tuber.

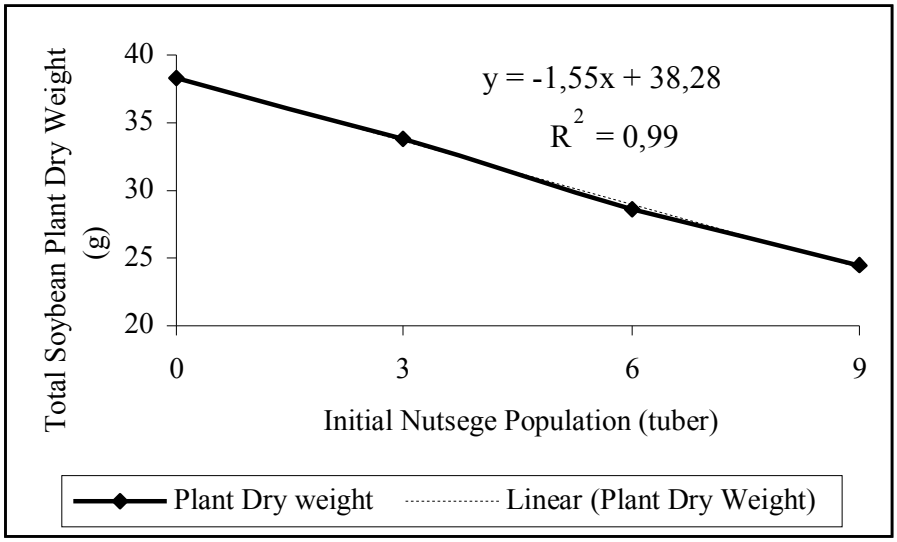

Figure 4. Graph of soybean (*G. max* L.(Merr.) plant dry weight on different initial nutsedge (*C. rotundus* L.) tuber population

The regression analysis between initial nutsedge tuber population and total soybean plant dry weight showed significant negative linear relationship (Figure 4).

B. Yield and Yield Components of Soybean

Results of analysis of variance showed that there is no interaction between the initial nutsedge tuber population and soybean varieties on the character of flower number. Only differences in soybean varieties caused significant affect on the number of flower, whereas the initial nutsedge tuber population treatment had no significant affect. The average amount of flower due to the different varieties of soybeans is presented in Table 7.

Table 7. Average flower number of soybean on different varieties

Variety	Flower number
Anjasmoro	67.50 ab
Argomulyo	73.58 ab
Burangrang	57.83 a
Cikuray	84.08 b
Kaba	80.83 b
LSD 5 %	S

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD %

Kaba and Cikuray varieties had a significantly higher total flower than Burangrang variety, but not different flower number to the Anjasmoro and Argomulyo varieties.

Based on the analysis of variance was known that there was no interaction between variety and initial nutsedge tuber population on soybean flowering time. However, treatment of weed populations gave significant effect on flowering time, whereas the variety treatment did not affect significantly. The average time of flowering in soybean due to differences in weed populations are presented in Table 8.

Table 8. Average of soybean flowering time (dap) on different initial nutsedge tuber population

Initial Nutsedge Population (Tuber)	Soybean Flowering Time (dap)
0	42.2 a
3	45.93 b
6	49.27 c
9	49.80 c
LSD 5 %	S

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

Table 8 above shows that the initial nutsedge tuber population of 3 tubers has significantly affected soybean flowering plants compared to plants without nutsedge tuber. The denser initial nutsedge tuber population (6 and 9 tubers) caused more pronounced slowing on time of flowering of soybean. The average time of flowering is presented in Figure 5 below.

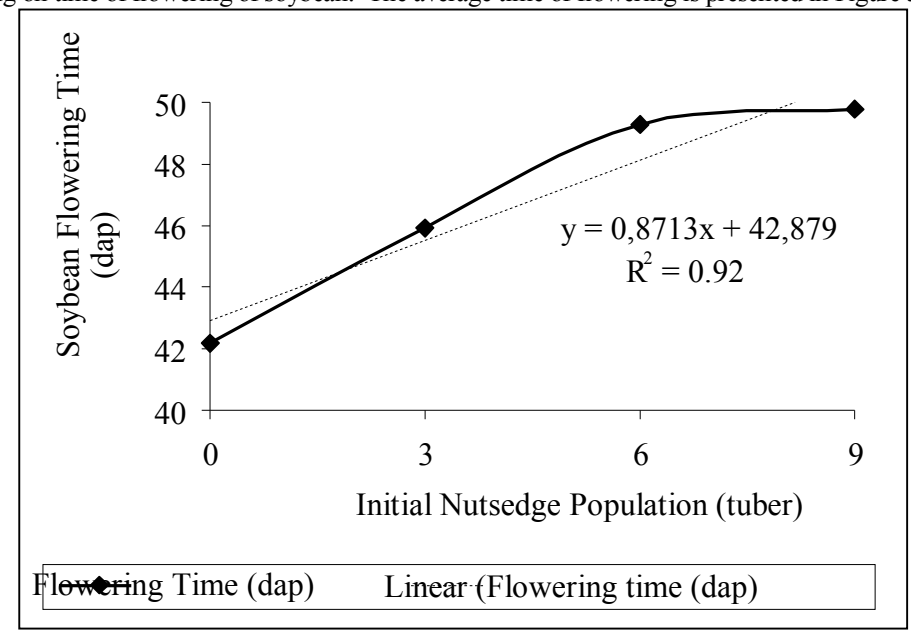

Figure 5. Graph of soybean (*G. max* L.(Merr.) Flowering time on different initial nutsedge (*C. rotundus* L.) tuber population

Results of analysis of variance showed that there is no interaction between the varieties and the population of weeds on the character of the total number of pods. Treatment of different varieties and initial nutsedge tuber populations gave significant effect on total number of soybean pods. Average number of soybean pods due to the influence of the initial nutsedge tuber population and different varieties are presented in Table 9.

Table 9. Average pod number of soybean on different varieties and initial nutsedge tuber population treatments

Variety	Pod number
Anjasmoro	38.75 ab
Argomulyo	42.67 b
Burangrang	34.25 a
Cikuray	45.25 b
Kaba	39.58 ab
LSD 5 %	s
Initial Nutsedge Population (Tuber)	Pod number
0	50.60 c
3	41.93 b
6	37.13 b
9	30.73 a
LSD5 %	s

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

Pod number of Cikuray variety was significantly higher than the pod number of Burangrang variety although was not different from the other three varieties. Due to differences in the initial nutsedge tuber population, 3 initial nutsedge tubers population had resulted in significant lower in pod number than without the nutsedge. The most serious influence is caused by the 9 initial nutsedge tuber populations on total soybean pod.

The regression analysis between initial nutsedge population and the number of soybean pod performed showed significant negative linear regression relationship (Fig. 6).

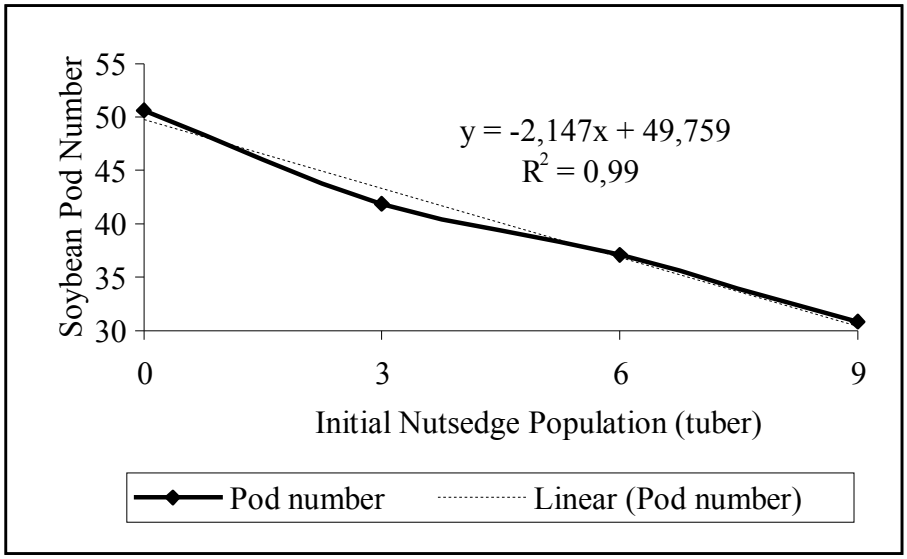

Figure 6. Graph of soybean (*G. max* L.(Merr.) pod number on different initial nutsedge (*C. rotundus* L.) tuber population

Results of analysis of variance showed that there was no interaction between the varieties and the initial nutsedge tuber population on the total seed weight per plant. Similarly, varieties differences did not cause differences in total soybean seed weight per plant. However, differences in initial nutsedge tuber population provided significantly different effect on the character of the total soybean seed weight per plant. Average seed weight per plant due to the influence of the initial nutsedge tuber population and different varieties are presented in Table 10.

Table 10. Average total soybean seed weight per plant on different initial nutsedge tuber population and different varieties

Initial Nutsedge Population (Tuber)	Total Soybean Seed Weight per Plant (g)
0	11.88 c
3	9.07 b
6	7.12 a
9	5.80 a
LSD 5 %	S

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

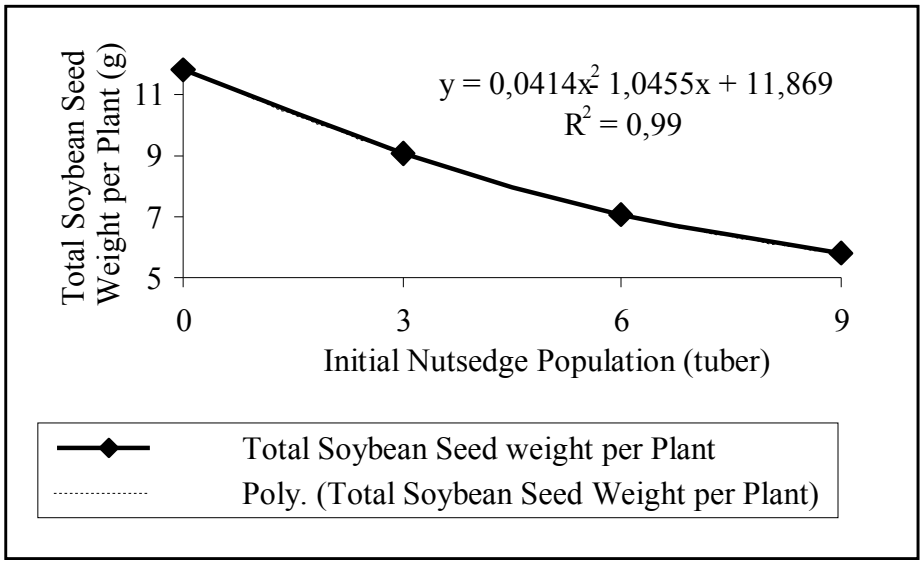

Figure 7. Graph of total soybean (*G. max* L.(Merr.) seed weight per plant on different initial nutsedge (*C. rotundus* L.) tuber population

Regression analysis on the relationship between initial population of weeds and total soybean seed weight per plant, found a significant quadratic regression relationship (Fig. 7). The denser nutsedge weed populations will be decreasing soybean seed weight produced. Sharp decrease in seed weight occurred in the density of 3 nutsedge tubers treatment from the treatment without nutsedge tuber (0 tuber), while the decline in soybean seed weight was not so sharply from the density of six to nine nutsedge tubers. Thus, the relationship between initial nutsedge tuber population and soybean seed weight was significantly negative quadratic.

No interaction between variety treatment and different initial nutsedge tuber population on 100 seed weight variable based on the analysis of variance. Variety treatment gave significant effect on the character of 100 seed weight, but different initial nutsedge tuber population did not cause differences in these 100 soybean seeds. Average weight of 100 seeds at different soybean varieties is presented in Table 11.

Table 11. Average 100 soybean seed weight on different varieties

Variety	100 seed weight (g)
Anjasmoro	13.50 b
Argomulyo	11.07 a
Burangrang	14.79 b
Cikuray	10.92 a
Kaba	11.03 a
LSD 5 %	s

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

Weight of 100 seeds of Burangrang and Anjasmoro varieties are the same. Both of these varieties have the weight of 100 seed significantly higher than Argomulyo, Cikuray, and Kaba varieties.

C. Growth of Nutsedge (*C. rotundus* L.)

Plant height of nutsedge observed at different times of observations, presented in form of graphical growth in Figure 8.

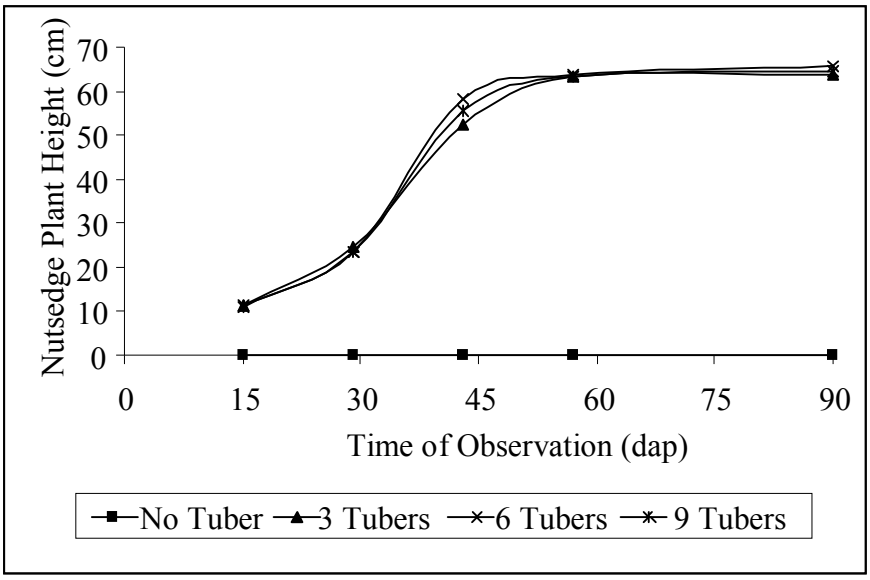

Figure 8. Graph of nutsedge plant height on different time of observations

Growth of nutsedge tiller number based on the initial nutsedge tuber population was observed periodically and was presented in graphical form in Figure 9 below.

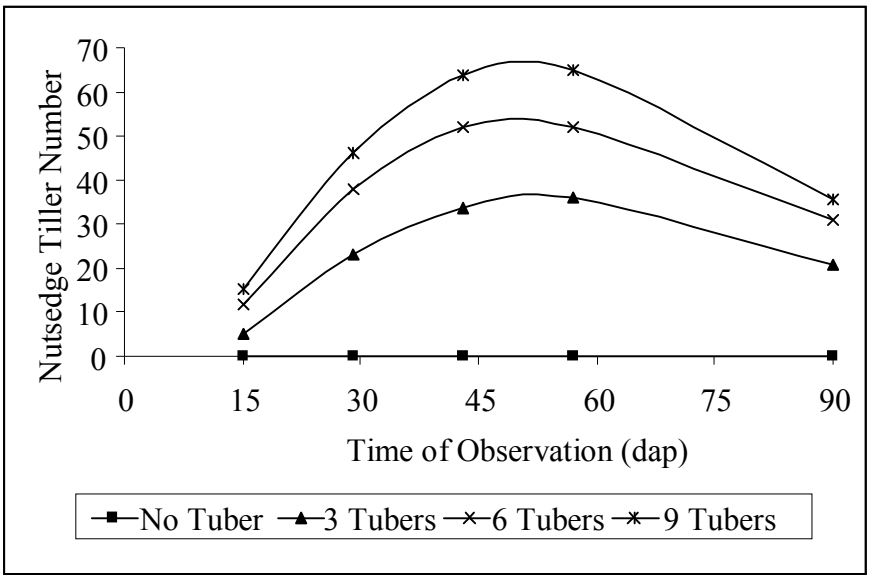

Figure 9. Graph of nutsedge tillering growth

Different initial nutsedge tuber population resulted in total nutsedge plant fresh weight as listed in Table 12 below.

Table 12. Average total nutsedge plant fresh weight on different initial nutsedge tuber population

Initial Nutsedge Population (tuber)	Total Nutsedge Plant Fresh Weight (g)
0	0.00 a
3	190.30 b
6	187.05 b
9	245.95 c
LSD 5 %	s

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

Observations on total nutsedge plant dry weight due to differences in initial population are presented in Table 13 below.

Table 13. Average nutsedge plant dry weight on different initial nutsedge tuber population

Initial Nutsedge Population (Tuber)	Total Nutsedge Plant Dry Weight (g)
0	0.00 a
3	154.46 b
6	156.19 b
9	212.02 c
LSD 5 %	s

Note : The value that was accompanied by the same letters in the same column are not significantly different at 5% LSD

D. Relative Yield of Soybean Varieties (*G. max* L. Merr.)

The calculation of the percentage reduction is based on the number of pods and seed weight per plant, and the results of calculations are presented in tables 14 and 15 for the number of pods and seed weight per plant, respectively.

Table 14. The yield that can be maintained (%) by different varieties of soybean (*G. max* L. Merr.) at various initial nutsedge populations (*C. rotundus* L.) based on the number of pods

Variety	Pod Percentage Produced (%) at Various Initial Nutsedge Populations (tuber)			
	0	3	6	9
Anjasmoro	100	71.43	65.84	51.55
Argomulyo	100	85.80	74.69	55.56
Burangrang	100	80.00	73.85	62.31
Cikuray	100	88.68	82.39	70.44
Kaba	100	88.44	70.07	64.63

Table 15. The yield that can be maintained (%) by different varieties of soybean (*G. max* L. Merr.) at various initial nutsedge populations (*C. rotundus* L.) based on the seed weight per plant

Variety	Percentage of seed weight produced per plant (%) at Various Initial Nutsedge Populations (tuber)			
	0	3	6	9
Anjasmoro	100	65.17	58.46	35.89
Argomulyo	100	83.54	56.99	55.37
Burangrang	100	60.65	50.47	46.35
Cikuray	100	91.63	83.36	61.14
Kaba	100	91.39	55.41	50.66

Tables 14 and 15 above show that the percentage of the decreased soybean yield due to treatment of the initial nutsedge tuber population of 3 tubers per polybag generally cause a decrease into the lowest yield in all varieties tested when compared to the initial nutsedge population of six and nine tuber per polybag. Cikuray variety generally has a better competitive trait based on the least decrease of yield if being compared to other varieties.

DISCUSSION

Tolerances reflect the relative response of a genotype to the constraints, so that tolerance is often used as a selection criterion. Tolerance is defined as the difference between the results in an environment without obstacles and results in an obstacle environment, or relatively is the percentage decrease in the yield as a consequence of environmental stress [4]. The competition of nutsedge with other plants or crops is through the roots. There is a decreased ability of plant roots caused by allelopat as an inhibitor for the nutrient and water absorption that affect the growth and formation of chlorophyll, so it will inhibit photosynthesis. Research results showed that, in general, the initial nutsedge tuber population affects the growth of soybean, especially on the characters of leaf number and number of branches. Treatment of the initial nutsedge tuber population did not affect significantly on the soybean plant height at the early observation, but at 90 dap there was an interaction effect between variety and initial nutsedge tuber population treatments on the soybean plant height. The initial nutsedge tuber population gave a significant effect on branch and leaf number of soybean. The higher initial nutsedge tuber population caused the lower number of leaves and branches of the soybean. This situation was further severed by the increasing number of tillers formed by nutsedge, so the competition is stricter. It was found that the number of soybean branches increased with increasing soybean leaf number. This situation showed that there was a reciprocal relationship of each components of growth, in this case the number of leaf and branch. The value of these components on soybean becomes smaller due to weed competition [5]. In this experiment showed that the

highest number of branches and leaves were found in Cikuray variety. Leaves are an important organ for the process of photosynthesis. More and more leaves are formed; the photosynthates produced will be also more and more. High photosynthates will ensure good plant growth and development.

Total dry weight of plants is a form of biomass that were produced and accumulated by soybean plants during growth on various treatments used. Different initial nutsedge tuber population and varieties gave a significant effect on total dry weight character. Cikuray variety had higher total plant dry weight than most other varieties. This was followed by the low dry weight of nutsedge that grow with them. The value of the nutsedge dry weight describes the amount of resources that can be absorbed by the nutsedge that can no longer exploited by cultivated plants for their food [6]. This research showed that Cikuray variety had a better capability to suppress the growth of nutsedge if being compared with other varieties. As stated by Bianchi *et al*. [7], soybean plants having the ability to compete with weed has a high plant biomass, and in addition to have a better seed yield.

For the number of pods character, Cikuray variety showed the highest value than the other varieties, as well as on the percentage of decreasing yield, Cikuray variety showed the lowest decline of yield in the initial nutsedge population of 3, 6 and 9 tubers. In the initial nutsedge population of 3 tubers had been able to lead to decrease the number of soybean pods. In the initial nutsedge population of 9 tubers, each of soybean varieties showed the greatest decline in the number of pods if compared to other treatments of the initial nutsedge population. Result of this research also showed that pod number was much lower if compared to the flower formed. On the treatment of initial nutsedge tuber population, the greater the initial nutsedge tuber population, the greater the nutsedge formed tillers. This is consistent to the research conducted by Munir *et al*. [8], which indicates that the high population of weeds resulted in the least number of pods formed, the high percentage of damaged pods and pod borer attack. On the seed weight per plant, the initial nutsedge population of 3 tubers had been able to give significant effect. This can be related to the delay in flowering of soybean. At the beginning of three nutsedge tuber populations have been able to slow the aging on each variety of soybean flowering. As stated by Sardjono *et al*. [9], the existence of competition with weeds in soybean plants causing delay in flowering. Kallman [10] as stated by Basir [11] suggested that a late flowering can result in the number of pods and seeds less than the potential yield owned by these varieties. This can be caused by the shortness of time of pod filling, so that the seed formation is not maximal. In 100 seed weight character, there was only variety treatment that provides significant influence. In this character Burangrang variety has the greatest weight of 100 seeds than other varieties. This is in accordance with the description of these varieties (Appendix 1c), which states that Burangrang variety has the biggest size and weight of 100 seeds if being compared to the other varieties. As stated by the Mimbar [12], that weed competition is little or no effect on seed size or number of seeds per pod.

CONCLUSION

The nutsedge population had negative effect on soybean plant growth characters i.e.: number of leaves decreased significantly due to initial population density of 9 nutsedge tubers, while the number of branches and total dry weight of soybean plants also decreased significantly due to the initial nutsedge population of 6 tubers. Time of flowering in soybean plants also slowed significantly by the population density of nutsedge starting from as many as three tubers. Initial nutsedge population of 3 tubers was also significantly lowered number of soybean pods formation and seed weight per plant. Cikuray variety showed the lowest decreased of characters observed if compared to other varieties for the number of pods and seed weight per plant due to initial nutsedge weed population, so it is considered to have the competitive trait to nutsedge weeds are better than Anjasmoro, Argomulyo, Burangrang, and Kaba varieties.

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