The effect of the number of rows and varieties of soybean on growth and yield in intercropping with corn

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Abstract. Intercropping is a breakthrough in land use optimization. This study aim is to determine the effect of the number of rows and soybean varieties on the growth and yield of soybean in intercropping with corn. This study was set in a split plot design with three replication. The main plot was soybean varieties: Dena-1 (V1), Detap-1 (V2) and Deja-1 (V3), while subplots were the number of rows of soybean planting lines: Monoculture (B0), 3 rows of soybean-3 rows of corn (B1), 4 rows of soybean-3 rows of corn (B2), and 6 rows of soybean-3 rows of corn (B3). The results show that V1 has the lowest plant height as 83.04 cm. The highest number of filled pods is achieved at V2B0 with 78.53 pods but not significantly different with V2B3 as 71.77 pods. B3 gave the lowest plant height 82.74 cm, weight of 100 seeds 15.93 g, and yield weight of 1.13 t ha⁻¹. The lowest populations of Nezara viridula and Bemisia tabaci was produced in V2B3. The highest land equivalent ratio (LER) is achieved in V3B3 1.45. This present study shows that implementing Detap-1 with 6 rows of soybean is better than other treatment in the intercropping with corn.

1. Introduction
Soybean is one of the strategic food crop commodities after rice and corn. National soybean production in 2018 amounted to 982,598 tonnes, the planted area of 680,373 or productivity of 1.44 t ha⁻¹[1]. The need for soybeans for various uses in 2015 and 2017 was 2,683,782 t and 3,313,322 t, respectively. Thus, the supply of soybeans from domestic production in 2018 was deficit around 2.33 million t. The increase in the soybean deficit is expected to continue until 2020, amounting to 1.91 million t [2].

Efforts to increase soybean production faces considerable challenges, compared to rice and maize, because the planting area tends to decrease due to less demand. The decrease in interest is due to the fluctuating and low selling prices, so that it is less profitable. Farmers are working more on supporting food crops such as rice and corn, competition for land use, considering that agroecology and planting season are relatively the same as for maize. Efforts that can be taken to expand the soybean harvest area are to include soybeans in maize production centers and upland rice in an intercropping pattern.

The government has established self-sufficiency in soybean commodities in 2020 with a production of 2.5 million t. One of the government's efforts, through the Ministry of Agriculture, to boost domestic soybean production is through expansion of planting using the intercropping method. Efforts are made
through intercropping (intercrop) soybean-corn and upland soybean-rice with the innovation of tight spacing.

Intercropping is a system of planting two or more types of plants simultaneously on the same land within one year. Intercropping is one of the breakthroughs in optimizing land use by planting more than one type of plant, conserving land, eliminating pests and plant diseases. The intercropping system for legume and cereals commonly used by farmers does not always give good results due to the selection of inappropriate varieties [3].

The application of the intercropping system planting pattern is strongly influenced by the arrangement of spacing (density) and the selection of varieties. Selection of superior soybean varieties is prioritized because superior varieties have a relatively early age, tolerant of biotic and abiotic stress, and high yield [4]. Arrangement of plant density or plant population in an intercropping pattern is one of the factors that can suppress crop competition [5].

Soybeans and maize can be used for intercropping because they have different morphologies, soybeans are C3 plants that are quite shade tolerant, short-husked, and branched with a tight canopy, while maize is a C4 plant that requires direct lighting, highly cultured and does not branch with a canopy tenuous [6]. Taah et al. [7] stated that spatial arrangement in an intercropping pattern of cassava with two and three rows of legume crops is a better choice for resource-poor farmers because it is able to suppress weed growth. Sundari and Mutmaidah [8] stated that corn is planted three weeks before soybeans, with a spacing of 2.2 m x 0.5 m x 0.2 m for 3 m long and 0.35 m x 0.10 m for soybeans, two seeds per hole with a row ratio of corn and soybeans (2:6). The intercropping pattern of maize and soybeans with a row ratio (2:6) gives an LER value >1. The combination of soybean+corn intercropping with an LER value >1 indicates that the productivity of the intercropping land is higher than monoculture. Agronomic advantages of implementing the intercropping system can be evaluated by calculating the land equivalent ratio (LER), LER value is generally obtained by comparing the intercropping pattern with monocultures [9].

The optimal planting model for the corn+soybean intercropping pattern is to use a double row corn cropping pattern, spacing (40 cm x 12.5 cm) x 120 cm, 1 plant per clump (population 100,000 plants ha\(^{-1}\)) with soybean varieties Dega-1, among others. Multiple rows of corn (120 cm) planted 3 rows of soybeans, spacing 30 cm x 10 cm, 2 plants per clump (population 375,000 plants ha\(^{-1}\)), this model not only gives the highest total yield, but also provides higher income and economic viability. The land use intensity with Model 1 is 2.6 times higher than planting in monoculture. The soybean that gives high yields in the intercropping pattern of soybeans and corn is the Dega 1 variety (early maturity) [10].

This study aims to determine the number of rows and varieties of soybean that provide the highest growth and yield of soybeans in the intercropping with corn.

2. Materials and methods

This research was conducted at the Maros experimental garden of AIAT of South Sulawesi, Allepolea Village, Lau District, Maros Regency, South Sulawesi from May to September 2019. Materials and tools used in this study include soybean seeds Dena-1, Detap-1, and Deja-1 varieties, HJ-21 Agritan corn, Urea, NPK Phonska, herbicides, fungicides, insecticides, PM-400 multi grain moisture tester.

This study used a split plot design as the main plot, namely soybean plants, which consisted of 3 varieties, namely V1 (Dena-1), V2 (Detap-1), and V3 (Deja-1). Subplots are the number of rows of soybean in intercropping with corn, consisting of B0 (monoculture), B1 (3 rows of soybeans and 3 rows of corn), B2 (4 rows of soybeans and 3 rows of corn), and B3 (6 rows of soybeans and 3 rows of corn). There were 12 treatment combinations, with three replications, resulting 36 treatment layout units in the field.

2.1. Research methods

The planting of soybeans and corn was carried out at the same time. Corn seeds are planted 3 to 5 cm deep, 2 seeds per hole, with a tight spacing of 40 cm x 20 cm. Soybean seeds are planted 3 to 5 cm deep, 2 to 3 seeds per hole with a spacing of 40 cm x 20 cm. The number of rows of corn overlaid with
soybeans is 3 rows. The row spacing between maize and soybeans was 40 cm with a treatment plot size of 6 m x 6 m. In one plot of 36 m² size for monoculture treatment (B0) of soybeans and corn, a population of 450 plants was obtained, treatment of 3 rows of soybeans and 3 rows of corn (B1) obtained a population of 225 soybean plants and 225 maize plants, 4 rows of soybeans and 3 rows of corn (B2) obtained a population of 257 soybean plants and 193 corn plants, and treatment of 6 rows of soybeans and 3 rows of corn (B3) obtained a population of 300 soybean plants and 150 corn plants.

Fertilization was carried out at the age of 10 and 35 days after planting (DAP). The dose was 300 kg ha⁻¹ of Urea and 250 kg of NPK 15:15:15 ha⁻¹. Weeding was conducted at 4 weeks after planting (WAP). Pests and disease was controlled by ng insecticides and fungicides. The application of insecticides and pesticides was carried out in the vegetative phase at 7 DAP and in the generative phase age 30 to 60 DAP. Watering was done on time planting (corn and soybeans), flowering and shaping soybean pods.

2.2. Parameters
The parameters consists of plant height, the number of filled pods per plant, weight of 100 seeds, seed weight per hectare at harvest and land equivalent ratio (LER).

The land equivalent ratio is a description of the efficiency of land use. The land equivalence value can be calculated once the crops are harvested. The calculations were carried out on intercropping soybean yield (Yab), monoculture soybean yield (Yaa), intercropping corn yield (Yba), monoculture corn yield (Ybb). LER value can be calculated to determine the level of land efficiency in the intercropping system that was tried. According to Beets [11] LER can be calculated using the formula:

\[ \text{LER} = \frac{\frac{Yab}{Yaa}}{\frac{Ybb}{Yba}} \]  

(1)

2.3. Data analysis
The data were analyzed by means of variance (ANOVA) with the F test at a level of 0.05. If the treatment showed a significant effect, a further test of the least significant difference (LSD) was carried out at the α 0.05 level.

3. Results and discussion

3.1. Plant height
The results of the LSD α 0.05 in table 1 showed the lowest plant height was produced in Dena-1 (V1) (83.04 cm), but significantly different with Detap-1 (V2) (88.67 cm) and Deja-1 (V3) (87.82 cm).

Table 1. The average plant height treated with various types of varieties and the number of rows of soybean plants at 48 days after planting.

| Varieties (V) | Soybean row (B) | Monoculture (B0) | 3 rows (B1) | 4 rows (B2) | 6 rows (B3) | Average | LSD α 0.05 |
|--------------|----------------|------------------|------------|------------|------------|---------|------------|
| Dena-1 (V1) |                | 75.53            | 88.38      | 88.80      | 79.45      | 83.04a  |            |
| Detap-1 (V2) |                | 80.53            | 95.40      | 93.63      | 85.10      | 88.67b  | 1.75       |
| Deja-1 (V3) |                | 79.83            | 94.47      | 93.32      | 83.66      | 87.82b  |            |
| Average      |                | 78.63p           | 92.75q     | 91.92q     | 82.74p     |         |            |
| LSD α0.05    |                |                  |            |            |            | 4.63    |            |

The column and rows number (followed by a similar letter) has no significant difference at 5% LSD test.

Treatment of monoculture (B1) produced the lowest plant height (78.63 cm) not significantly different with 6 rows of soybean (B3) (82.74 cm). Treatment of 3 rows of soybean produced the highest plant (92.75 cm). This was because the area of soybean in treatment B1 was narrower and the number of population of soybean was less if compared with B2 and B3 treatments in intercropping with maize,
with the lack of sunlight intensity e to the shade of the corn canopy could affect the vegetative growth of soybean such as etiolation/elongation of cells, the stem segments increase in length. Soybean plants that grow in a shaded environment have a higher plant height than plants in an environment without shade [12]. The effect on plants with more than 25% of shade was etiolation, namely changes in plant stem elongation [13]. This happen because the high auxin production and distribution, stimulate cell elongation which encourages the increasing plant height [14].

3.2. Number of pods filled soybean (pods)
The highest number of filled pods was produced in the treatment of Detap-1 and monoculture (V2B0) (78.53 pods) and not significantly different from the treatment of Detap-1 and 6 rows of soybean (V2B3) (71.77 pods). Detap-1 and 3 rows of soybean (V2B1) produced the lowest number of filled pods (43.82 pods).

Table 2. The average number of filled pods treated with various types of varieties and the number of rows of soybean plants.

| Varieties (V) | Soybean row (B) | Monoculture (B0) | 3 Rows (B1) | 4 Rows (B2) | 6 Rows (B3) | LSD α0.05 |
|---------------|----------------|-----------------|-------------|-------------|-------------|-----------|
| Dena-1 (V1)   | 69.57<sup>a,b</sup> | 47.71<sup>c</sup> | 53.50<sup>a,b</sup> | 66.60<sup>a,b</sup> | 7.91 |
| Detap-1 (V2)  | 78.53<sup>a</sup> | 43.82<sup>c</sup> | 50.77<sup>a</sup> | 71.77<sup>a</sup> | 4.05 |
| Deja-1 (V3)   | 71.20<sup>a,b</sup> | 42.98<sup>c</sup> | 53.02<sup>c</sup> | 63.28<sup>c</sup> | 7.91 |

The column and rows number (followed by a similar letter) has no significant difference at 5% LSD test.

Detap-1 with monoculture system (V2B0) produced the highest number of pods. This might be due to the characteristic of the Detap-1 soybean variety, which has a large number of pods. This was due to the large number of rows of soybeans among maize plants, so the soybean area was wider. This gives a smaller effect of corn shade to soybean plants, so that the solar radiation absorbed by soybean plants was quite efficiently utilized for plant photosynthesis. Detap-1 and 3 rows of soybean (V2B1) produced the lowest number of filled pods (43.82 pods). This was because the effect of 3 rows of soybeans among corn plants caused the number of filled pods to decrease due to the corn canopy, the closer the plants were. soybeans to the shade source, the lower the solar radiation received. Sundari and Susanto [15] reported that the intensity of shading by up to 75% reduces the total light absorption rate, photosynthesis rate and the number of filled pods in soybeans, this is in line with the research of Pratiwi and Artari [16] who mentioned that maize was potential to provide a shade effect that is not different from 50% parnet shade.

3.3. Pests Nezara viridula and Bemisia tabaci

*Nezara viridula* is a pod sucking pest in soybean. Young and adult ladybugs damage the pods by puncturing the stylet on the pod skin, penetrating the seeds and then sucking the liquid of the seeds so the pods become deflated or empty. According to Radiyanto et al. [17] *N. viridula* was one of the main pests in soybean with the highest population of 14% compared to *Riptortus linearius* 11% and *Ophiomyia phaseolos* 8% found in soybean plantations in Balong-Ponorogo, East Java. Nurparidah [18] suggests that the development of the population of *N. viridula* when entering the generative phase, 7 week after plant (WAP) reaches 0.17 plant<sup>−1</sup>, then increases to 0.24 plant<sup>−1</sup> at the age of 8 WAP and the highest 1.04 plant<sup>−1</sup> at the age of 10 WAP. Population and level of damage varies depending on the type of soybean varieties planted by farmers. Damage to the pods due to *N. viridula* punctures resulted in a decrease in seed yield and quality [19]. The level of pod damage due to *N. viridula* pest attack varies in the field depending on the soybean variety planted by the farmer, planting time and climatic conditions. In this study, it was shown that the lowest *N. viridula* population was in the Detap-1 (0.83 plant<sup>−1</sup>) and the
highest was in Deja-1 (1.42 plant\(^{-1}\)). Manurung et al. [20] state that a population of 1 adult \(N.\ viridula\) per two plants can cause pod damage by 49%. According to the research results of Samosir et al. [21], the attack rate of \(N.\ viridula\) was higher in soybean (83.95%) than in long bean (33.85%). The \(B.\ tabaci\) pest was a pest that attacks soybean plants in South Sulawesi. The population level of \(B.\ tabaci\) pests varies widely in the field depending on the types of varieties. This was in accordance with [22] that population of \(B.\ tabaci\) on each soybean variety was different and the highest was in Detam-4 (21 tails), followed by Rajabasa (8 tails), Devon-2 (6 tails), and Deja-2 (5 tails) per plant clump.

**Table 3.** The average population of \(N.\ viridula\) and \(B.\ tabaci\) in each variety of soybean.

| Type of varieties (V) | Population of \(N.\ viridula\) (tails plant\(^{-1}\)) | Population of \(B.\ tabaci\) (tails plant\(^{-1}\)) |
|-----------------------|-------------------------------------------------|---------------------------------|
| Dena-1 (V1)           | 1.17b                                           | 2.33b                           |
| Detap-1 (V2)          | 0.83a                                           | 1.75a                           |
| Deja-1 (V3)           | 1.42b                                           | 3.25c                           |

The column number (followed by the similar letter) has no significant difference at 5% LSD Test.

The population of \(N.\ viridula\) pests was lower in the soybean-corn intercropping system (0.56-1.11 plant\(^{-1}\)) compared to monocultures of around 1.89 plant\(^{-1}\) (table 4). According to Fattah et al. [23] the population of \(N.\ viridula\) in the soy-chili intercropping system is lower (2.92 tails m\(^{-2}\)) than in the monoculture system 5.19 tails m\(^{-2}\). Siagan et al. [24] on green bean intercropping with spring onion and sunflower can increase insect diversity and stabilize the ecosystem. Furthermore, it is said that the intercropping of chilies-scallions can reduce pest attacks on chilies so that the chili production increases to 12 t ha\(^{-1}\) compared to the yield in monocultures which only reaches 8.0 t ha\(^{-1}\).

**Table 4.** The average population of \(N.\ viridula\) and \(B.\ tabaci\) in each 4 cropping models.

| Planting model (B) | Population of \(N.\ viridula\) (tails plant\(^{-1}\)) | Population of \(B.\ tabaci\) (tails plant\(^{-1}\)) |
|-------------------|-------------------------------------------------|---------------------------------|
| Monoculture (B0)  | 1.89c                                           | 4.11c                           |
| 3 rows (B1)       | 1.11b                                           | 2.33b                           |
| 4 rows (B2)       | 1.00b                                           | 2.00b                           |
| 6 rows (B3)       | 0.56a                                           | 1.33a                           |

The column number (followed by the similar letter) has no significant difference at 5% LSD test.

The highest attack rate of \(B.\ tabaci\) was in monoculture (2.22 tails plant\(^{-1}\)) and the lowest was in the treatment of 6 rows of soybean (1.11 tails plant\(^{-1}\)). The lowest population of \(B.\ tabaci\) in the soybean-corn intercropping system was due to the role of natural enemies such as \(Coccinella\) sp. In general, there are more polyculture cropping models, this was in accordance with the research results of Siagan et al. [24], the highest population of \(Aphis\) pests was in green bean monoculture (22.71 individuals) and the lowest was in the intercropping of green beans+shallots (12.09-18.86 individuals). Furthermore, it was said that the highest predatory population of \(Coccinella\) sp was in the intercropping of 6 rows of soybean-2 rows of maize (3.78 m\(^{2}\)) and the lowest was in soybean monocultures (2.11 m\(^{2}\). The high predatory population of Coccinella sp in soy-corn intercropping compared to monocultures was due to the balance of the ecosystem. According to [25], insect diversity (18 species) was found in soybean intercropping with \(C.\ juncea\) with 5 soybean rows-1 row \(C.\ juncea\) compared to without \(C.\ juncea\) (9 species).
3.4. Weight of 100 soybeans (g)

The results of the LSD a 0.05 in table 5, showed the highest weight of 100 seeds was produced in the Detap-1 (V2) (17.34 g), significantly different from Dena-1 (V1) (15.55 g) and the Deja-1 (V3) (13.26 g). Deja-1 (V3) produced the lowest weight of 100 seeds (13.26 g).

Table 5. Average weight of 100 soybean seeds treated with various types of varieties and number of rows of soybean plants.

| Varieties (V) | Soybean row (B) | Monoculture (B0) | 3 rows (B1) | 4 rows (B2) | 6 rows (B3) | Average | LSD a0.05 |
|--------------|----------------|------------------|-------------|-------------|-------------|---------|-----------|
| Dena 1 (V1)  |                | 15.71            | 15.87       | 14.69       | 15.94       | 15.55 b |           |
| Detap (V2)   |                | 18.31            | 16.77       | 16.07       | 18.22       | 17.34 a | 0.48      |
| Deja (V3)    |                | 13.87            | 12.54       | 13.02       | 13.62       | 13.26 c |           |
| **Average**  |                | **15.96 p**      | **15.06 q** | **14.59 q** | **15.93 p** |         | **0.68**  |

The column and rows number (followed by a similar letter) has no significant difference at 5% LSD test.

The treatment of soybean monoculture (B0) showed the highest weight of 100 seeds (15.96 g), significantly different from the treatment of 3 rows of soybeans (B1) (15.06 g) and 4 rows of soybeans (14.59 g), but not significantly different from treatment of 6 rows of soybeans. (B3) (15.93 g). Treatment of 4 rows of soybean (B2) produced the lowest weight of 100 seeds (14.59 g). The weight of 100 soybean seeds in the intercropping treatment with corn B1, B2, and B3 was smaller than that in monoculture. In line with the research of [26] which states that the weight of 100 soybean seeds in intercropping with cassava (14.56 g) was smaller than that in monoculture 17.99 g. Soybean that grow in a shaded environment during the generative phase will experience a decrease in photosynthetic activity so that the allocation of photosynthate to the reproductive organs is reduced [27]. This cause seed size becomes smaller than in the shadeless condition. The intercropping treatment of soybeans and maize gave lower yields than the monoculture cropping pattern because the intercropping treatment caused competition in light and soil nutrients.

3.5. Seed weight per hectare (t ha⁻¹)

The results showed that highest seed weight was in the monoculture treatment (B0) (2.61 t ha⁻¹). It was significantly different from other treatments (table 6). Treatment of 3 rows of soybean (B1) produced the lowest seed weight per hectare (0.59 t ha⁻¹). The intercropping treatment of soybeans and corn gave lower yields than the monoculture cropping pattern because the intercropping treatment occurred competition in light and soil nutrients.

Table 6. Average seed weight per hectare treated with various types of varieties and number of rows of soybean plants.

| Varieties (V) | Soybean row (B) | Monoculture (B0) | 3 rows (B1) | 4 rows (B2) | 6 rows (B3) | Average | LSD a0.05 |
|--------------|----------------|------------------|-------------|-------------|-------------|---------|-----------|
| Dena 1 (V1)  |                | 2.80             | 0.78        | 0.95        | 1.17        |         |           |
| Detap (V2)   |                | 2.66             | 0.54        | 0.77        | 1.02        |         |           |
| Deja (V3)    |                | 2.38             | 0.45        | 0.80        | 1.21        |         |           |
| **Average**  |                | **2.61 p**       | **0.59 r**  | **0.84 r**  | **1.13 q**  |         | **0.28**  |

The rows number (followed by a similar letter) has no significant difference at 5% LSD test.
Intercropping of soybeans and maize resulted in a 56.70% to 77.39% reduction in soybean yield per unit area compared to the monoculture cropping pattern. In line with the research of Ghaffarzadeh et al. [28] who stated that soybean production in intercropping tends to be lower than in monocultures. The intercropping of soybeans with cassava result in a 50% reduction in soybean [26]. This reduction in yield due to the shading effect of the cassava plant so that light reception by soybean plants decreases along with the development of the cassava canopy which led to a reduction in the level of soybean photosynthesis. Thompson et al. [29] stated that when a plant was shaded, then the light intensity received will decrease, causing photosynthesis not to take place optimally. This condition will affect the amount of photosynthate produced. If the amount of photosynthate was not fulfilled for plant growth and development, it will affect production.

3.6. Land Equivalent Ratio (LER)

Table 7 showed that soybean production of Dena-1 (V1) variety of 2.80 t ha\(^{-1}\) was the highest compared to Detap-1 (V2) and Deja-1 (V3) varieties grown in monoculture, while corn production was 9.51 t ha\(^{-1}\).

| Varieties | Seeds yield (t ha\(^{-1}\)) |
|-----------|-----------------------------|
| Soybean:  |                             |
| V1 (Dena 1)| 2.80                       |
| V2 (Detap 1)| 2.66                       |
| V3 (Deja 1)| 2.38                       |
| Corn:     |                             |
| HJ 21 Agritan| 9.51                      |

Table 7. Average production of soybean and corn in the monoculture system.

Land equivalent ratio is a picture of land use efficiency. In general, the LER value of intercropping soybeans and maize with several soybean varieties was >1. This value of LER value of corn-soybean intercropping which is greater than one, it indicates that the corn-soybean intercropping pattern was beneficial in land use [5, 30]. According Zhang et al. [31], stated that the value of LER >1.0 means that the intercropping pattern could support the growth and yield of intercropped plant species. Conversely, when the LER value was <1.0, intercropping was not profitable and interspecific competition was stronger than interspecific interactions in the intercropping system. The LER value = 1.0 means there is no difference in yield between monocultures and intercropping [32, 33]. If the LER value was >1.0, there will be a yield advantage when the two plants were planted in intercropping compared to monocultures. However, if the LER value <1.0, it would be better if the two plants were planted separately (monoculture), because it would cause losses if planted in intercropping. According to Tsujimoto et al. [34], the LER value > 1.0 indicates the superiority of intercropping over monocultures. In this study the intercropping of several varieties of soybeans with corn was more profitable than monoculture or there was superiority of intercropping against monocultures.

The highest LER value was 1.45 which was achieved in the soybean intercropping of Deja-1 varieties with 3 rows of soybean (V3B3) (table 8). This means that to obtain the same results as the intercropping pattern, an area of 45% (0.45 ha) is required if both plants are grown in monoculture. In accordance to Aminah et al. [35], the highest LER value in corn and soybean intercropping was achieved in the Corn-Soybean 1:3 treatment (1.59). [36] stated that the increase in land productivity was caused by choosing the right combination of plants and cropping systems and the existence of a relationship or mutualism symbiosis between plants were planted intercroppingly. This symbiosis is closely related to the need for nitrogen for the main plant which was fulfilled from the attached plants through its ability to fix nitrogen from the air. On the other hand, plants that are tolerant to shade can live under stands. The combination of cereal crops and legumes wass the best combination [37].
## Table 8. Land equivalent ratio of intercropping soybean and corn.

| Treatments | Seeds yield of soybean (t ha⁻¹) | Seeds yield of corn (t ha⁻¹) | LER  |
|------------|----------------------------------|------------------------------|------|
| V1B1       | 0.78                             | 8.77                         | 1.20 |
| V1B2       | 0.95                             | 8.82                         | 1.27 |
| V1B3       | 1.17                             | 8.93                         | 1.36 |
| V2B1       | 0.54                             | 8.79                         | 1.12 |
| V2B2       | 0.77                             | 8.88                         | 1.22 |
| V2B3       | 1.02                             | 8.86                         | 1.31 |
| V3B1       | 0.45                             | 8.81                         | 1.12 |
| V3B2       | 0.80                             | 8.87                         | 1.27 |
| V3B3       | 1.21                             | 8.94                         | 1.45 |

### 4. Conclusions

The number of rows of soybean intercropped with corn had significant effect on plant height, number of filled pods, weight of 100 seeds, and seed weight per hectare. Interaction of number of rows of soybean dan soybean varieties (Detap-1 and 6 rows of soybean) gave the highest number of pods, provided the lowest pests populations of *N. viridula* and *B. tabaci* and value of LER >1. It means that intercropping is more profitable than monoculture. Therefore, Detap 1 variety is more recommended in intercropping 6 rows of soybean with corn.

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