Yield performance of 60 maize testcross hybrids with CML161-Nei9008 as tester at two trial locations

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Abstract. The interaction between genotype x environment is an essential knowledge for plant breeder to know and utilize, because performance of genotype at multiple environment can obtain different yield result. Constrain in achieving similar result due to genotype x environment interaction can cause difficulties in maize breeding program, even though analysis of this interaction is widely used to estimate how far the adaptability and stability possessed in a genotype. This study used sixty testcross hybrid genotypes, which were tested based on its yield performance at two locations (Muneng experimental station in East Java and Bajeng experimental station in South Sulawesi) during dry season of 2017. The objective of the study was to evaluate performance and Genotype x Environment interaction of 60 hybrids obtained from testcross with tester CML161-Nei9008. Experiment was arranged in a Randomized Complete Block Design with three replications and four check varieties (Bima 3, Bima 7, Bima 9, and Bima 10). Combined analysis for yield and yield components was carried out following standard procedure for maize yield trial. This study revealed a highly significant Genotype x Environment Interaction for yield of all genotypes. CML2017042 was found to have the highest yield potential and most suitable to be developed in Muneng. Another high yielding line, CML2017040, performed high yield potential and good adaptability at both Muneng dan Bajeng. Yields of those two genotypes (CML2017042 and CML2017040) were 15% higher compared to all check varieties.

1. Introduction
Maize production fluctuates from time to time and from one location to another. Fluctuations in yield due to fluctuations in environmental factors are closely related to the mechanism of plant stability performance [1]. Breeders can assemble specific and widely adapted hybrids to find the cultivar which optimally utilize the local agro-ecological conditions. The particular cultivar is not only high yielding and pest and disease resistance, but also highly stabile against certain environmental range.

Selection of superior genotypes is usually based on phenotypic appearance. Accordingly, genotypes which maintain a high level of performance on broad environmental condition are generally a desired genotype by breeding program or within the framework of its development. However, the relative performances of quantitative characters of various genotypes often vary from one environment to another [2]. The relation between genes and the performance of characters and growth environment is described in a simple linear model as follows: \( P = \mu + g + e + ge \), with \( \mu \) = the average value of a character in a population, \( g \) = the influence of genotype, \( e \) = the influence of environment on gene performance, and \( ge \) = the effect of interaction between genes and environment.
Genotype by environment interaction (G × E) is associated with adaptation capabilities possessed by an individual or a population of plants in a particular environment. For agricultural crops, the analysis to predict the interaction (G × E) is mostly done on seasonal crops (annual) planted at several locations as the environment variations are generally spatial. For plantation crop which is annual crop (perennial), the environmental variance analysis is generally sequential. [3].

This study aimed to evaluate agronomic performance and yield of 60 testcross hybrids, including their genotype x environment interaction estimates.

2. Materials and Methods
The experimental material consisted of sixty hybrids (extract from the population CML=CIMMYT MAIZE LINE) and four check varieties (Bima 3, Bima 7, Bima 9, Bima and Bima 10). The experimental was conducted at Muneng station (Indonesian Legumes and Tuber Crops Research Institute (ILETRI), Probolinggo, East Java, and Bajeng station (Indonesian Cereals Research Institute (ICERI)), Gowa, South Sulawesi during the dry season, from July to November 2017. The experiment was arranged in randomized block design with three replications. Each hybrid was planted in two rows in plot size of 0.75 x 0.20 m and 5 m length, 2 kernel per hill. Three weeks after planting, the plant was thinned to one plant per hill. Fertilization was applied twice, 300 kg ha⁻¹ Urea + 300 kg ha⁻¹ Phonska at planting, and, 100 kg ha⁻¹ Urea at 30 days after planting. Carbofuran was applied during planting to control Caterpillar with 8 kg ha⁻¹ dosage.

The data collected included yield (t ha⁻¹), chlorophyll content of ear leaf (%), husk cover (score 1-5), plant aspect (score 1-5), ear aspect (score 1-5), moisture content (%), number of harvested plants, number of harvested ear, plant height (cm), ear height (cm), ear length (cm), ear diameter (cm), number of kernel row, number of kernel per row, selling percentage (%), 1000 kernel weight (g). The data analysis of each location and combined locations were performed using IRRISTAT program.

3. Results and Discussion
Location of Muneng station have altitude ±10 meters above sea level, alfisol soil type, previous crop soybeans, whereas Bajeng station ± 50 meters above sea level, ultisol soil type, previous crop maize. Different environmental conditions show different genotypic responses at each test location, this can be seen by the presence of genotype x environment interactions in Table 1.

| Source of Variation | Degree of Freedom | Mean Square |
|---------------------|-------------------|-------------|
| Replications (R)    | 2                 | 1.440       |
| Environment (E)     | 1                 | 1474.34*    |
| Genotypes (G)       | 63                | 2.87425*    |
| G x E               | 63                | 1.68955*    |
| Error               | 127               | 1.265       |
| Corrected Total     | 255               | 7.545       |

Note: ** = highly significant, * = significant

The range of hybrid adaptation is independent of its development location, although it is specifically adapted to certain climate and soil type and produce high yield in suitable environment. According to the interaction mean square value, there was difference on production ability among the genotypes evaluated in both location, Bajeng and Muneng (Table 1). The result indicated the genotype with high yielding potency and adaptable to Muneng condition were not suitable to Bajeng environment thus it produced low yield at Bajeng.
Table 2. Grain yield (t/ha⁻¹) percentage of Bima 3, Bima 7, Bima 9 Bima and Bima 10, of the best twenty hybrids at Muneng and Bajeng station in dry season 2017.

| Rk. | Genotype  | Yield (t/ha) | %Bima 3 | %Bima 7 | %Bima 9 | %Bima 10 |
|-----|------------|--------------|---------|---------|---------|---------|
|     |            | Muneng (Mng)| Big (Bjg)| Muneng (Mng)| Big (Bjg)| Muneng (Mng)| Big (Bjg)| Muneng (Mng)| Big (Bjg)| Muneng (Mng)| Big (Bjg)|
| 1   | CML 2017052| 9.80         | 6.34    | 8.07    | 100     | 114     | 107     | 108     | 152     | 130     | 116     | 100    | 108     | 117     | 88      | 103     |
| 2   | CML 2017008| 9.71         | 6.09    | 7.90    | 99      | 109     | 104     | 107     | 146     | 126     | 115     | 96     | 106    | 116     | 85      | 101     |
| 3   | CML 2017042| 9.61         | 8.44    | 9.03    | 98      | 151     | 125     | 106     | 202     | 154     | 114     | 133    | 123    | 115     | 118     | 116     |
| 4   | CML 2017032| 9.59         | 6.75    | 8.17    | 98      | 121     | 109     | 106     | 162     | 134     | 114     | 106    | 110    | 115     | 94      | 104     |
| 5   | CML 2017024| 9.34         | 6.76    | 8.05    | 95      | 121     | 108     | 103     | 162     | 133     | 111     | 106    | 109    | 112     | 94      | 103     |
| 6   | CML 2017048| 9.33         | 7.96    | 8.64    | 95      | 143     | 119     | 103     | 191     | 147     | 111     | 125    | 118    | 112     | 111     | 111     |
| 7   | CML 2017040| 9.32         | 8.47    | 8.90    | 95      | 152     | 124     | 103     | 203     | 153     | 111     | 133    | 122    | 112     | 118     | 115     |
| 8   | CML 2017035| 9.27         | 7.88    | 8.57    | 95      | 141     | 118     | 102     | 189     | 146     | 110     | 124    | 117    | 111     | 110     | 110     |
| 9   | CML 2017044| 9.26         | 6.25    | 7.76    | 95      | 112     | 103     | 102     | 150     | 126     | 110     | 98     | 104    | 111     | 87      | 99      |
| 10  | CML 2017031| 9.24         | 5.32    | 12.28   | 94      | 274     | 184     | 102     | 367     | 234     | 110     | 241    | 175    | 111     | 213     | 162     |
| 11  | CML 2017049| 9.10         | 5.10    | 7.10    | 93      | 91      | 92      | 101     | 122     | 111     | 108    | 80     | 94     | 109     | 71      | 90      |
| 12  | CML 2017025| 9.05         | 4.48    | 6.76    | 92      | 80      | 86      | 100     | 107     | 104     | 108    | 70     | 89     | 108     | 62      | 85      |
| 13  | CML 2017038| 8.98         | 7.51    | 8.25    | 92      | 135     | 113     | 99      | 180     | 140     | 107    | 118    | 112    | 108     | 105     | 106     |
| 14  | CML 2017018| 8.80         | 6.26    | 7.53    | 90      | 112     | 101     | 97      | 150     | 124     | 105    | 98     | 101    | 105     | 87      | 96      |
| 15  | CML 2017015| 8.73         | 8.26    | 8.50    | 89      | 148     | 119     | 97      | 198     | 147     | 104    | 130    | 117    | 105     | 115     | 110     |
| 16  | CML 2017041| 8.70         | 5.11    | 6.91    | 89      | 92      | 90      | 96      | 122     | 109     | 103    | 80     | 92     | 104     | 71      | 88      |
| 17  | CML 2017011| 8.67         | 6.24    | 7.46    | 89      | 112     | 100     | 96      | 149     | 123     | 103    | 98     | 101    | 104     | 87      | 95      |
| 18  | CML 2017030| 8.63         | 8.17    | 8.40    | 88      | 146     | 117     | 95      | 196     | 145     | 103    | 128    | 115    | 103     | 114     | 109     |
| 19  | CML 2017003| 8.62         | 7.04    | 7.83    | 88      | 126     | 107     | 95      | 196     | 132     | 103    | 111    | 107    | 103     | 98      | 101     |
| 20  | CML 2017014| 8.54         | 4.93    | 6.74    | 87      | 88      | 88      | 94      | 118     | 106     | 102    | 77     | 89     | 102     | 69      | 86      |
| 60  | CML 2017017| 3.52         | 5.26    | 4.39    | 36      | 94      | 65      | 39      | 126     | 82      | 42     | 83     | 62      | 42      | 73      | 58      |

Check varieties:

- Bima-7: 9.05 4.18 6.61 92 75 84 100 100 100 108 66 87 108 58 83
- Bima-3: 9.79 5.58 7.69 100 100 100 108 134 121 116 88 102 117 78 98
- Bima-9: 8.41 6.37 7.39 86 114 100 93 152 123 100 100 101 101 89 95
- Bima-10: 8.35 7.18 7.76 85 129 107 92 172 132 99 113 106 100 100 100

Mean: 8.86 6.88 7.87
CV(%): 15.6 20.3 20.2
SE: 0.9 1.45 0.80
LSD(0.05): 2.4 4.09 2.23
G x E: - - *

Note: Mng = Muneng station, Bjg = Bajeng station, * = significant

One major goal of cereal breeding is to increase grain yield per unit area. [4],[5],[1] the interaction between genotype x environment influences the progress of selection. Certain genotype produces high yielding at particular area, but low yielding at other area. The combined variance analysis showed genotype CML 2017042 and CML 2017040 produced highest yield and low genotype x environment interaction in both stations, Bajeng and Muneng (Table 2). These genotypes produced relatively the same number of harvested ear compared to the genotypes evaluated. However the number of kernel row and kernel were higher than other genotypes thus resulted in higher yield potency.
The performance of chlorophyll content, husk cover, ear and plant aspects, moisture content of the best twenty hybrids at Muneng and Bajeng station in dry season 2017.

| Rk | Genotype  | KIEL | HC (1-5) | PA (1-5) | EA (1-5) | KA (%) |
|----|-----------|------|----------|----------|----------|--------|
|    |           | Mean | Mean     | Mean     | Mean     | Mean   |
|    |           | Bjm  | Bjm      | Bjm      | Bjm      | Bjm    |
| 1  | CML 2017052 | 51.6 | 23.4     | 37.5     | 2.5      | 2.3    | 2.4    | 2.0    | 2.5    | 2.3    | 1.8    | 2.3    | 2.0    | 24.1   | 18.2   | 21.1   |
| 2  | CML 2017008 | 49.8 | 40.2     | 45.0     | 1.0      | 2.3    | 1.6    | 2.0    | 2.3    | 2.1    | 1.8    | 1.8    | 1.8    | 24.7   | 19.4   | 22.0   |
| 3  | CML 2017042 | 35.4 | 31.7     | 33.5     | 2.0      | 2.8    | 2.4    | 1.5    | 2.3    | 1.9    | 1.8    | 2.0    | 1.9    | 24.3   | 23.4   | 23.9   |
| 4  | CML 2017032 | 44.2 | 47.5     | 45.9     | 3.0      | 2.5    | 2.8    | 2.3    | 2.0    | 2.1    | 1.8    | 2.0    | 1.9    | 25.2   | 22.5   | 23.9   |
| 5  | CML 2017024 | 46.3 | 31.7     | 39.0     | 1.0      | 2.3    | 1.6    | 2.0    | 2.0    | 2.0    | 1.8    | 2.0    | 1.9    | 23.6   | 23.8   | 23.7   |
| 6  | CML 2017048 | 44.3 | 39.8     | 42.1     | 2.0      | 2.3    | 2.1    | 1.8    | 2.0    | 1.9    | 1.5    | 2.5    | 2.0    | 19.7   | 21.0   | 20.3   |
| 7  | CML 2017040 | 42.9 | 41.0     | 42.0     | 2.0      | 2.3    | 2.1    | 1.5    | 2.3    | 1.9    | 1.8    | 2.3    | 2.0    | 23.4   | 22.8   | 23.1   |
| 8  | CML 2017035 | 50.9 | 38.4     | 44.7     | 1.5      | 2.3    | 1.9    | 1.3    | 2.3    | 1.8    | 1.8    | 2.0    | 1.9    | 23.7   | 22.6   | 23.1   |
| 9  | CML 2017044 | 47.4 | 33.0     | 40.2     | 1.0      | 2.0    | 1.5    | 1.5    | 2.3    | 1.9    | 1.5    | 2.8    | 2.1    | 22.5   | 17.6   | 20.0   |
| 10 | CML 2017031 | 51.4 | 46.9     | 49.2     | 1.8      | 2.5    | 2.1    | 1.3    | 2.3    | 1.8    | 2.0    | 2.3    | 2.1    | 24.7   | 22.9   | 23.8   |
| 11 | CML 2017049 | 49.4 | 46.5     | 48.0     | 1.0      | 2.3    | 1.6    | 2.0    | 1.8    | 1.9    | 1.5    | 2.3    | 1.9    | 20.8   | 23.0   | 21.9   |
| 12 | CML 2017025 | 46.3 | 36.1     | 41.2     | 1.5      | 2.3    | 1.9    | 1.5    | 2.0    | 1.8    | 1.5    | 2.5    | 2.0    | 23.6   | 22.2   | 22.9   |
| 13 | CML 2017038 | 40.6 | 38.3     | 39.4     | 1.5      | 2.3    | 1.9    | 1.5    | 2.3    | 1.9    | 1.5    | 2.0    | 1.8    | 22.9   | 23.2   | 23.0   |
| 14 | CML 2017018 | 46.7 | 46.5     | 46.6     | 2.0      | 2.5    | 2.3    | 2.0    | 2.3    | 2.1    | 1.8    | 2.5    | 2.1    | 21.3   | 17.9   | 19.6   |
| 15 | CML 2017015 | 49.7 | 43.5     | 46.6     | 1.5      | 2.3    | 1.9    | 1.8    | 2.8    | 2.3    | 1.8    | 2.3    | 2.0    | 24.7   | 23.0   | 23.8   |
| 16 | CML 2017041 | 45.4 | 30.1     | 37.7     | 1.8      | 2.3    | 2.0    | 2.0    | 2.3    | 2.1    | 2.0    | 2.0    | 2.0    | 22.9   | 20.4   | 21.6   |
| 17 | CML 2017011 | 43.2 | 35.1     | 39.1     | 1.5      | 2.3    | 1.9    | 1.5    | 2.3    | 1.9    | 1.8    | 2.5    | 2.1    | 25.2   | 19.4   | 22.3   |
| 18 | CML 2017030 | 45.9 | 33.9     | 39.9     | 1.0      | 2.3    | 1.6    | 1.5    | 2.5    | 2.0    | 1.5    | 2.8    | 2.1    | 22.7   | 19.3   | 21.0   |
| 19 | CML 2017003 | 47.0 | 24.0     | 35.5     | 1.5      | 2.3    | 1.9    | 1.5    | 2.0    | 1.8    | 1.8    | 2.0    | 1.9    | 26.3   | 23.6   | 25.0   |
| 20 | CML 2017014 | 48.0 | 44.9     | 46.5     | 2.0      | 2.8    | 2.4    | 1.3    | 2.0    | 1.6    | 1.8    | 2.3    | 2.0    | 24.7   | 24.4   | 24.5   |
| 21 | CML 2017017 | 56.4 | 35.3     | 45.8     | 2.5      | 2.5    | 2.5    | 1.8    | 2.3    | 2.0    | 3.0    | 1.8    | 2.4    | 24.5   | 22.1   | 23.3   |

**Note:** KIEL = Chlorophyl ear leaves (%), HC = Husk Cover, PA = Plant Aspect, EA = Ear aspect, and KA = Moisture content (%).

The potency of high yield of certain hybrid is determined by the higher number of harvested ear, kernel row, weight of 1000 kernel and ear diameter and length [6]. The average of yield percentage of were 15% higher than four check varieties (Bima 3, Bima 7, Bima 9 and Bima 10).

Table 3 shows the average of chlorophyll content of ear leaves for CML 2017042 was 33.5 units and CML 2017040 was 42.0 units. While the husk cover of the genotypes was well closed the ear, while the plant aspect and ear aspect were scored for 2, which means closing ear pretty good. The husk cover which perfectly closed the ear protects the ear from pests and diseases infection and resulted in fairly uniform appearance thus suitable for harvesting machine. Ear covered both generally more tolerant to pests and diseases that attack corn ears [7]. The seed moisture content of genotypes
harvested at Bajeng station was relatively low (17.6-24.4%) compared to genotypes harvested at Muneng station (19.7-27.5%). The difference of moisture content of two locations was due to the rainfall at harvesting time, in which the rainfall in Bajeng was very low.

There was no significant effect of the two locations on plant and ear height, the average of each genotype were 197.3 cm and 100.20 cm respectively. The genotypes evaluated were produce one ear per plant (Table 4). It can be concluded that the genotypes will produce relatively the same ear, but different potency on grain filling.

Based on the observations on two locations, there were difference on the performance of ear diameter, number of kernel, weight of 1000 kernel and yield of 60 hybrids. In addition, the range and average values of observed characters varied in the two locations (Table 5). This result suggested there was difference optimal condition for the genotypes growth at two different environments.

The combined analysis showed there was no genotype by environment interaction for agronomic traits and yield components (Table 5). This result indicated there was no difference on the genetic potency for agronomic traits and yield components of the genotypes at two locations. The productivity of a plant is determined by genetic factors, environmental factors and the interaction of genetic and environmental factors. The environmental factors include the location, the season and cultivation method including fertilization. The correspondence between genetic and environmental factors is the major determinant in increasing crop productivity [8].
| Rk | Genotype      | PHv | EHv | Ph | EH |
|----|---------------|-----|-----|----|----|
|    |               | Mag | Baj |    |    |
| 1  | CML 2017052  | 24.5| 21.5| 23.0| 24.5|
| 2  | CML 2017008 | 25.0| 16.0| 20.5| 24.0|
| 3  | CML 2017042 | 25.0| 19.5| 22.3| 25.5|
| 4  | CML 2017032 | 25.0| 17.0| 21.0| 25.0|
| 5  | CML 2017024 | 24.5| 23.0| 23.8| 24.5|
| 6  | CML 2017048 | 25.0| 21.0| 23.0| 27.0|
| 7  | CML 2017040 | 24.5| 20.0| 22.3| 24.5|
| 8  | CML 2017035 | 24.5| 21.5| 23.0| 25.0|
| 9  | CML 2017044 | 22.5| 18.0| 20.3| 26.0|
| 10 | CML 2017031 | 25.0| 24.0| 24.5| 25.0|
| 11 | CML 2017049 | 23.5| 17.0| 20.3| 25.0|
| 12 | CML 2017025 | 24.5| 11.0| 17.8| 25.0|
| 13 | CML 2017038 | 24.5| 19.5| 22.0| 25.5|
| 14 | CML 2017018 | 24.5| 21.0| 22.8| 25.0|
| 15 | CML 2017015 | 22.0| 24.5| 23.3| 23.5|
| 16 | CML 2017041 | 25.0| 21.0| 23.0| 25.5|
| 17 | CML 2017011 | 24.0| 21.5| 22.8| 23.0|
| 18 | CML 2017030 | 24.0| 25.0| 24.5| 24.0|
| 19 | CML 2017003 | 25.0| 21.0| 23.0| 26.0|
| 20 | CML 2017014 | 25.0| 12.5| 18.8| 23.5|
| 21 | CML 2017017 | 7.0 | 14.5| 10.8| 10.0|

Check varieties:

- Bima-7
- Bima-3
- Bima-9
- Bima-10

Mean:

- 21.9 ± 0.2

CV (%): 9.3 ± 2.7

SE: 1.4 ± 0.3

LSD (0.05): 4.1 ± 0.9

Note: PHv = Number of plant harvest, EHv = Total ear harvest, Ph = Plant height (cm), EH = ear height (cm), and El = Ear length (cm).
Table 5. The ear diameter, number of seed row, number of kernel, yield and weight of 1000 kernel of the best twenty hybrids at Muneng and Bajeng station in dry season 2017.

| Rk | Genotypes     | EDM | Ln | #NSR | SP | W1000 |
|----|----------------|-----|----|------|----|--------|
|    |                | Mean | Bnj | Mean | Bnj | Mean | Bnj | Mean | Bnj |
| 1  | CML2017052     | 4.8  | 4.3 | 4.5  | 14.6| 14.4 | 14.5| 32.4 | 32.8 |
| 2  | CML2017008     | 5.0  | 4.7 | 4.8  | 14.6| 15.0 | 14.8| 29.3 | 32.3 |
| 3  | CML2017042     | 4.6  | 4.6 | 15.2 | 16.1| 15.7 | 32.2| 39.1 | 35.7 |
| 4  | CML2017032     | 4.7  | 4.5 | 4.6  | 14.0| 13.8 | 13.9| 33.8 | 32.7 |
| 5  | CML2017024     | 4.6  | 4.5 | 4.5  | 13.4| 13.8 | 13.6| 31.8 | 32.0 |
| 6  | CML2017048     | 4.2  | 4.1 | 4.1  | 13.4| 12.6 | 13.0| 30.2 | 35.5 |
| 7  | CML2017040     | 4.5  | 4.4 | 4.4  | 13.0| 12.8 | 12.9| 31.0 | 35.9 |
| 8  | CML2017035     | 4.7  | 4.7 | 4.7  | 16.4| 16.3 | 16.4| 32.8 | 36.8 |
| 9  | CML2017044     | 4.6  | 4.4 | 4.5  | 16.0| 15.2 | 15.6| 31.6 | 31.9 |
| 10 | CML2017031     | 4.8  | 4.6 | 4.7  | 14.4| 14.0 | 14.2| 31.3 | 35.1 |
| 11 | CML2017049     | 4.6  | 4.4 | 4.5  | 14.0| 14.4 | 14.2| 32.7 | 31.1 |
| 12 | CML2017025     | 4.6  | 4.4 | 4.5  | 12.6| 13.4 | 13.0| 33.2 | 34.0 |
| 13 | CML2017038     | 4.4  | 4.2 | 4.3  | 13.2| 12.4 | 12.8| 34.2 | 34.9 |
| 14 | CML2017018     | 4.7  | 4.5 | 4.6  | 15.6| 15.0 | 15.3| 33.3 | 28.7 |
| 15 | CML2017015     | 4.7  | 4.5 | 4.6  | 17.2| 15.0 | 16.1| 35.7 | 36.4 |
| 16 | CML2017041     | 4.8  | 4.4 | 4.6  | 15.6| 13.8 | 14.7| 30.4 | 31.6 |
| 17 | CML2017011     | 4.6  | 4.2 | 4.4  | 14.6| 14.0 | 14.3| 34.8 | 35.0 |
| 18 | CML2017030     | 4.6  | 4.3 | 4.4  | 14.2| 13.8 | 14.0| 29.4 | 36.8 |
| 19 | CML2017003     | 4.7  | 4.5 | 4.6  | 15.4| 14.4 | 14.9| 31.2 | 32.4 |
| 20 | CML2017014     | 4.8  | 4.7 | 4.8  | 17.6| 17.2 | 17.4| 34.4 | 35.9 |
| 60 | CML2017017     | 4.7  | 4.7 | 4.7  | 15.8| 16.4 | 16.1| 32.9 | 35.9 |

Check Varieties:

| Genotypes | EDM | Ln | #NSR | SP | W1000 |
|------------|-----|----|------|----|--------|
|            | Mean | Bnj | Mean | Bnj | Mean | Bnj | Mean | Bnj |
| Bima-7     | 4.8  | 4.2 | 4.5  | 17.6| 13.8 | 15.7| 34.6 | 35.9 |
| Bima-3     | 5.1  | 4.6 | 4.9  | 14.2| 14.0 | 14.1| 30.8 | 39.2 |
| Bima-9     | 4.9  | 4.4 | 4.7  | 14.6| 14.0 | 14.3| 33.9 | 35.3 |
| Bima-10    | 5.0  | 4.6 | 4.8  | 13.0| 14.0 | 13.5| 35.8 | 29.9 |

Mean:

| CV(%) | SE | LSD(0.05) | G x E |
|-------|----|-----------|-------|
| 3.1   | 0.1| 0.3       | -     |

Note: EDM = Ear diameter (cm), Ln = Lines number of kernel, #NSR = number of kernel in rows, SP = Shelling percentage and W1000 = Weight of 1000 kernel (g).

4. Conclusion

Based on the results of testing at two location in Muneng station and Bajeng station can be concluded that: The potential outcome of the sixty hybrid genotypes were evaluated at two test sites are very diverse. CML2017042 have the highest yield potential and suitable to be developed in the Muneng station. CML2017040 have the highest yield potential and suitable to be developed in the Muneng station and Bajeng station. and CML2017040 and CML2017042 genotyping have above 15% percentage yield higher than four check varieties (3 Bima, Bima 7, 9 Bima and Bima 10).
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