



Research Paper

The Multi-Location Experiment Of Several Strains/Varieties of Short-Age Hybrid Corn with Total Production of More than 6 Tons/ Acre in North Sulawesi Province

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SUMMARY:- The use of New Superior Varieties (Indonesian: *Varietas Unggul Baru* or VUB) is one of the main components of technology that has a great role in increasing the production of corn in North Sulawesi Province. The forming of these varieties should follow a very long process where the last process is the Multi-Location Experiment. The BPTP of North Sulawesi Province has made a multi-location experiment of several strains/varieties of short-age hybrid corn that was held from February 2010 until November 2010 in Pandu Experimental Garden. This research is using the method of Random Group Design with 12 treatments and 4 Repetitions. The treatment consists of 10 strains of hybrid corn and 2 weighed varieties. The purpose of this activity is to evaluate the strains of hybrid corn that has high production (>6 tons/ acre) as well as the hybrid corn is appropriate with the ecosystem in North Sulawesi. Based on the data of analysis result there are two candidates of variety that can produce more than 6 tons/acre, they are HybG101 which can produce 7.53 tons/acre and HybG109 with 6.09 tons/acre. However, it is counted based on the result's potency; all the tested strains can produce more than 6 tons/acre. So, it is recommended to be planted in North Sulawesi.

Keywords:- Corn, hybrid, multi-location experiment, strain

I. INTRODUCTION

Corn is a strategic food plants as foodstuffs, fodder, and industrial raw material. The production of corn increase more and more every year as much as 5.6 % in line with the growth of the productivity and the width of corn planting. However, domestic production has not fulfilled the domestic's demand yet that always increase every year as much as 6.4 %. The strategy to fulfill the domestic's demand is by arousing the farmer's awareness to plant the corn (Kasyrno, F. 2002).

The assembling of free essence or hybrid corn variety regularly helps the farmer to provide superior variety that has high production. The diversity of certain choice of variety that is liked by the farmer, low cost production, and the availability of cheap good seed can help to keep and increase the national corn production.

The corn productivity that can be reached by the farmer is still low so the development of corn farming is an urgent challenge (Sudaryanto et al., 1988). The effort to improve the national corn production by increasing the productivity and the enlargement area of planting has last in various ecosystem environments from the fertile land until the marginal land. The growth and the corn production is influenced by the climate (sunlight and rainfall), the condition of land and the planted corn variety (Sutoro et al., 1988).

In advance farming, the seed has a role as the messenger that bring the technology contained in genetic potential variety to the farmer. New Superior Varieties (VUB) are the component of main technology in increasing the productivity of corn (the Department of Research and Development for Farming, 2009). The seed that is received by the farmer should be in high quality. It means that the variety should be original or real and pure so it can reflect the superior nature from the variety which it is represented, clean and fit that it will not become the source of weeds and disease's spreading, as well as it alive and has high level of health so that it can grow well if planted in the field.

The availability of high quality seed from superior variety in precise amount and time is a component of technology packet to improve the production so that it needs to be anticipated by multiplication superior seed (Suswono H. 2009)

The allocating of new superior varieties always proceeded by examining the expected strains that has high potential production and constant with wide and specific adaptation. The result of multi-location examining or the examination of potency of sequel result shows that each strain has its own superiority so it is appropriate to be nominated as the new superior variety.

The problem of corn planting in North Sulawesi is the low productivity of corn and instability of price. The low productivity is caused by the low level of applying the technology especially the using of superior seed and the balance fertilizing. Generally, the farmers use local variety and hybrid variety. The using of hybrid variety is limited to the seed given by the government or a public interest group. It is not based on the farmer's desire.

North Sulawesi BPTP has made multi-location examination in several strains/varieties hybrid corn. The purpose of this examination is to evaluate the strain of hybrid corn that has high production (>6 tons/acre) as well as appropriate with the North Sulawesi's ecosystem as the solution of that problem solving.

II. METHODOLOGY

This research is held in Pandu Experimental Garden in the North Minahasa regency from February to November 2010 at the altitude 110 meters above the sea level. It is created in Random Group Design with 12 treatments that consists of 10 short age hybrid strains and 2 weighed varieties as well as 4 Repetitions planted in 5 rows by using 2 seeds each hole. The distance between each hole is 75 cm and the depth is 20 cm. The replanting is held at day 15 after planting by leaving one plant per hole.

The fertilizer that is given by using measuring pot 360 kg/acre Ponska, 128 kg/acre SP-14; 60 kg/acre NK (10:20) and 150 kg Urea, or equal with the recommendation 300 Kg Urea, 200 Kg SP-36 and 100 Kg KCl/acre. Fertilizing is held by making a hole beside the plant then closing the hole again. The first fertilizing is held 7-10 days after planting by using all the dosage of Ponska, SP-14 and NK. The second fertilizing (special for Urea) is held when the age of the plant is 30-35 after planting. Meanwhile, the third fertilizing depends on the result of observation through the Diagram of Leaf Color.

The parameters that are observed consists of the number of the growing plants and the number of the plant harvested from 50 planting holes, the days when it blossoms (male and female), determined after 50% of male and female bud come out, the height of the plant measured at the top of vegetative growth, the height of the corn cob position, the length of corn cob, the diameter of corn cobs, the number of nut's row, the weight of the 100 nuts, the weight of 5 corn cobs, the weight of nuts every 5 corn cobs, and water content.

III. FINDINGS AND DISCUSSION

The observation is held on 2 rows outside the border with the total 50 planting hole. The number of growing plant per VUB/strain vary from the lowest 27.33 (54.66 %) at *VUB Makmur* until the highest in the Strain HybG107 as much as 45 (90%). Then, the number of harvested plant decreases. The lowest number is still at *VUB Makmur* as much as 17.33 (34.66) and the highest is in Strain HybG101, 30.33 (60.66 %). It can be seen in the following table.

Table 1. The result of the observation toward the number of growing plant, harvested plant, the day when male and female bud come out (50%), the height of plant and the height of VUB corn cob and the expected strain of short age hybrid corn.

VUB/Strain	the number of growing plants	The number of harvested plants	The age of male bud (hst)	The age of female bud (hst)	The height of plants (cm)	The height of corn cob (cm)
HybG109	37.33 abc	28.00 a	51.67 ab	53.67 ab	195.3 c	93.00 ab
HybG105	29.00 abc	23.67 a	51.00 ab	53.00 ab	197.0 bc	87.33 ab
Makmur	23.33 c	17.33 a	52.00 a	53.67 ab	199.0 bc	86.00 b
Gumarang	39.33 ab	21.67 a	51.67 ab	53.67 ab	207.7 ab	92.67 ab
HybG104	27.33 bc	20.67 a	52.00 a	53.67 ab	198.3 bc	89.00 ab
HybG108	34.33 bc	23.67 a	51.00 ab	53.00 ab	198.7 bc	93.67 ab
HybG101	38.00 abc	30.33 a	51.33 ab	53.00 ab	193.7 c	85.67 b
HybG103	37.33 abc	24.33 a	50.67 ab	52.50 b	207.7 ab	95.00 ab
HybG102	37.00 abc	20.00 a	50.33 b	53.00 ab	207.3 ab	94.33 ab
AS1	37.67 abc	21.33 a	52.00 a	54.00 a	207.3 ab	102.00 a
HybG106	41.00 ab	23.67 a	51.67 ab	53.00 ab	203.7 ab	95.33 ab
HybG107	45.00 a	24.67 a	50.33 b	52.50 b	212.3 abc	96.33 ab

Information: the number which is followed by the same letter in one column is not clearly different at testing phase 5 %.

Table 1 also shows that for aging variable of blossom for male, it can be seen that *Makmur* variety AS1 and HybG104 clearly different with strain HybG103 and HybG107. Meanwhile, other strains and varieties are not clearly different. The age of blossoms for female bud that is clearly seems different is AS1 with strain HybG103 and HybG107. Meanwhile, the others do not seem clearly different. The age of blossoms has a tight connection with the fertilization where the closer of the age for the male and female bud to fertile, the bigger its possibility for fertilization to happen.

The observation towards the height of the plant shows that the highest strain HybG107 is 212.3 cm. on the other hand, the shortest is the strain HybG101, and 193.7 cm. it shows that the shortest strain has lower level of endurance or level of obliqueness (J. H. W. Rembang, et al. 2004)

The height variable of corn cob position is in the Table 1. It shows that the strain that its corn cob position that has the closest position from the ground is HybG101 with 85.67 cm and *Makmur* variety with 86 cm. Meanwhile, the strain that its corn cob position that has the highest position from the ground is AS1 variety with 102 cm. It shows that the AS1 variety will be more difficult to be attacked by the pest especially mouse pest than other varieties.

The observation towards the corn cob is presented in Table 2.

The lowest average of length at strain HybG102 is 14.03 cm until 17.97 cm in *VUB Makmur*. Although the number of growing plant and the number of harvested plant *VUB Makmur* is the lowest, it always superior in terms of the length of corn cob, the biggest diameter of corn cob (4.89 cm), the number of nut's row (14.53 rows), the weight of 100 nuts (32.97 gr), the weight for 5 corn cobs (1,317 gr), and the weight of nuts for every 5 corn cob (986.67 gr).

Table 2. The productivity of several VUB and the expected strain of hybrid corn in North Sulawesi

VUB/ Strain	Dry Harvest ton/acre			Moisture Content 14% (ton/acre)		
	Real	The appropriate growth potency	Potency 66000 tan/acre	Real	The appropriate growth potency	Potency 66000 tan/acre
HybG109	6.09	8.11	10.87	4.76	6.35	8.51
HybG105	5.29	4.68	11.18	4.24	5.20	8.96
Makmur	4.51	6.08	13.02	3.46	4.66	9.99
Gumarang	4.77	8.65	11.00	3.53	6.41	8.15
HybG104	4.37	5.77	10.56	3.43	4.54	8.31
HybG108	5.73	8.31	12.10	4.35	6.31	9.20
HybG101	7.53	9.43	12.41	5.81	7.27	9.57
HybG103	5.35	8.21	11.00	4.2	6.46	8.65
HybG102	3.08	5.70	7.70	2.42	4.48	6.06
AS1	4.88	8.62	11.44	3.73	6.58	8.74
HybG106	5.52	9.56	11.66	4.22	7.30	8.91
HybG107	5.80	10.57	11.75	4.45	8.12	9.02

The problem of the limited availability of seed material from the seed's source causes the potency for the seed to growth rather insufficient. Even the number of the harvested plant is only 20-30 plants from 50 plants per planting plot (Table 1). This extremely affected the productivity (Table 3). So the real result that is achieved only strain HybG101 (7.53 tons/acre) and HybG109 (6.09 tons/acre) that fulfill the purpose of the research. Besides, by fulfilling the 3 expected strains with its productivity more than 6 tons/acre, the average of appropriate potency of plant grow is more than 6 tons/acre. Even the potency that can be achieved if the whole plant (population ± 66000 plants) can be harvested is >8 tons/acre (at the water content 14 %). It shows that all strains/varieties hybrid corn that are tested is suitable planted in North Sulawesi.

IV. CONCLUSIONS

The hybrid seed from the tested strains can be the solutions to fulfill the farmer's necessity of good seeds. There are two strains of hybrid corn, they are HybG101 (7.53 tons/acre) and HybG109 (6.09 tons/acre) that can fulfill the target of 6 tons/acre

The result potency from the whole strains/varieties tested is suitable to be planted in North Sulawesi

REFERENCES

- [1]. Badan Penelitian dan Pengembangan Pertanian. 2009. Deskripsi Varietas Unggul Palawija 1918 – 2009. (In Indonesian) Badan Penelitian dan Pengembangan Pertanian.
- [2]. Janne. H. W. Rembang; I. E. Malia dan D. Masoara. 2004. Penampilan Beberapa Galur/Varietas Jagung di Kecamatan Dimembe. (In Indonesian) Prosiding Seminar Nasional Klinik Teknologi Pertanian sebagai Basis Pertumbuhan Usaha Agribisnis Menuju Petani Nelayan Mandiri. Badan Penelitian dan Pengembangan Pertanian. Departemen Pertanian. 2004
- [3]. Kasryno, F. 2002. Perkembangan Produksi dan Konsumsi Jagung Dunia Selama Empat Decade yang lalu dan Implikasinya bagi Indonesia. (In Indonesian) Makalah disampaikan pada Diskusi Nasional Agribisnis Jagung. Bogor Badan Litbang Pertanian
- [4]. Sudaryanto, T, K. Noekman dan F. Kasryno. 1988. Kedudukan Komoditi Jagung dalam Perekonomian Indonesia. (In Indonesian). Buku Jagung Badan Penelitian dan Pengembangan Pertanian, Pusat Penelitian dan Pengembangan Tanaman Pangan. Bogor 423 hal.
- [5]. Suswono H. 2009. Rencana Strategis Pembangunan Pertanian Tahun 2009 – 2014. (In Indonesian).
- [6]. Sutoro, Y. Sulaeman, dan Iskandar. 1988. Budidaya Tanaman Jagung. Badan Penelitian dan Pengembangan Pertanian. (In Indonesian). Pusat Penelitian dan Pengembangan Tanaman Pangan. Bogor