

# Economic Analysis of Hybrid Maize in South Sulawesi

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**ABSTRACT.** The government of Indonesia has paying attention to increase maize production by both expanding planting acreage and use more intensive agricultural methods to grow maize in order to meet the demand for food, feed, industry and export. A strong demand and good domestic prices had been attracting farmers to grow hybrid maize and its acreage will keep increasing particularly in South Sulawesi Province. The use of hybrid seed in maize production have been tested in two regencies, Bantaeng and Bone respectively. The result indicated that the cost of hybrid maize production account for approximately 30% of the total production cost. Most of the cost used to afford certified hybrid seed and fertilizer. Total cost of production was Rp 3,551,800 whereas the revenue gained was about Rp 7,385,000. Thus the use of hybrid maize in Bantaeng could benefit the farmers of about Rp 3,833,120. B/C ratio gained from maize production was 2.08. In addition to Bone, total cost production was 1,030,000 with the revenue of about 10,384,000. B/C ratio gained from maize production was 7.12, indicating that the use of hybrid seed in maize production would benefit farmers.

Keywords : Hybrid maize, economic analysis, South Sulawesi

## Introduction

Maize is among the most important cereal crop in Indonesia and is a promising option for food diversification as it is more resilient to changing climate. In recent years, it has seen a notable growth rate and has contributed significantly to the national economy sector. Central Bureau of Statistics have reported that during 1970-2000, the area planted to maize was about 19% of the total area planted to food crops. However in recent years, the area planted to maize has increased to about 32% of the total area planted to food crops. A strong demand and good domestic prices had been attracting farmers to grow maize and its acreage will keep increasing in future at this commodity is more resilient to climate change and lower input production.

Maize production in South Sulawesi Province has increased in recent decades to meet the domestic demand and export. South Sulawesi have been continuously exporting maize to Malaysia, Singapore and Japan. Integrated crop management (ICM) have also introduced to the farmer such as use of certified seed, site specific nutrient management etc. Adoption of technology is mainly affected by farmers' knowledge and financial availability to afford the needs. Thus more attention needs to be paid to technologies that require fewer assets and less expensive inputs. Bantaeng Regency is one of regency in South Sulawesi Province. Bantaeng is now getting popular as the local government has been paying attention to increase maize production and productivity through ICM in the area.

This paper will present maize production overview in South Sulawesi Province including regional maize production and domestic use of maize. In the last part we will discuss the economic consideration of introducing hybrid technology to increase maize production in Bantaeng and Bone Regency to meet the increasing demand for food, feed and industry.

## Maize Production in South Sulawesi

South Sulawesi is among the major producing province in Indonesia with the contribution of about 7.5% to the total national maize production. Other producers are East Java (30%), Central Java (16%), Lampung (10%), North Sumatera (7%), West Java (5%) and Gorontalo (4%). Maize is an important commodity in South Sulawesi because it has a strategic role in meeting the food needs of the people and the demand for industries in the region.

Maize area, production and yield in South Sulawesi have seen a phenomenal growth over the last decade. For the last 10 years (2002-2012), maize production has increased from 661,000 tons in 2002 to about 1,015,554 in 2012. Maize productivity has also increased significantly in the decade from 3.21 t/ha in 2002 to 3.90 t/ha in 2012. Maize area increased from 205,909 ha in 2002 to 320,178 ha in 2012 (Table 1).

In South Sulawesi, Bantaeng Regency has contributed significantly to the province level production. Although the area of maize was less than 30,000 ha (2010 data) but the production reached 177,000 ton or 7.5% of the total

Table 1. Harvest area, production and productivity of maize in South Sulawesi.

Years	Harvest areas (ha)	Production (ton)	Productivity (t/ha)
2002	205.909	661005	3,21
2003	213.818	650832	3,04
2004	199.310	674716	3,44
2005	210.336	705995	3,42
2006	206.387	696084	3,37
2007	262.214	969955	3,69
2008	262.214	1195691	4,19
2009	299.699	1395742	4.66
2010	303.375	1343044	4.27
2011	297.126	1420154	4.78
2012	320.178	1457879	4.55
Growth (%)	4.86	8.93	3.8

Sources: BPS Statistics Indonesia and Directorate General of Food crops 2003, 2005, 2008, dan 2012

province production. Bantaeng has also successfully disseminating hybrid maize to the farmers that contribute to enhance maize production. The productivity of maize in Bantaeng was 5.9 t/ha, higher than national average productivity (less than 4.3 t/ha). Nowadays, farmers in Bantaeng grew local varieties for home consumption only, while for commercial purposes they grew hybrids or recycled hybrids. A few of them also grew improved OPVs. Most of farmers intend to make more profit using the available improved technologies in maize production.

In general, most of the land in Bantaeng is classified as rainfed lowland and affected by monsoon. Rainfed lowland accounted for about 85.7% of the total area while the remaining 28.6% is dry land. Although rainfall in this region sufficient but it is often that maize will suffer from drought, particularly in the dry season. Cropping index also varied according to the water availability. About 92.9% of the land was planted twice a year while 7.1% was left for bare. Farmers usually left their land for bare during dry season due to the lack of water. Since the majority of maize is grown in the rainfed dryland regions, the crop is commonly sown with the first rains. Once the crop is established, there may be an unpredictable and erratic moisture supply from rainfall.

In addition to Bone Regency, harvest area, production and maize productivity during 2001 to 2011 is shown in Table 4. Table 3 shown that that harvest area increased by 4.35% while the productivity and maize production increased by 3.74% and 10% respectively. Most of the farmer used to grow hybrid maize in Bone. Maize hybrid that commonly planted were BISI 2, PIONER, NK 33 and NK 32.

Table 2. Harvest area, productions and productivity of maize in Bantaeng Regency, South Sulawesi.

Years	Harvest areas (ha)	Production (ton)	Productivity (t/ha)
2001	31,519	101,397	3.22
2002	36,924	168,818	4.57
2003	33,102	132,693	4.09
2004	27,245	127,211	4.66
2005	29,280	138,071	4.72
2006	23,905	96,038	4.17
2007	33,240	152,958	4.60
2008	29,264	152,495	5.21
2009	25,429	144,381	5.68
2010	27,012	144,035	5.33
2011	28,532	172,120	6.03
Growth (%)	2,65	0,41	8

Sources: BPS Statistics Indonesia and Directorate General of Food crops 2003, 2005, 2008, dan 2012

Table 3. Harvest Area, Production and Productivity of Maize (2001-2011) in Bone Regency, South Sulawesi.

Years	Harvest areas (ha)	Production (ton)	Productivity (t/ha)
2001	39,699	76,747	1.93
2002	35,822	68,982	1.93
2003	54,458	109,913	2.02
2004	29,602	67,530	2.28
2005	40,798	95,571	2.34
2006	33,171	71,942	2.17
2007	40,653	129,314	3.18
2008	41,553	150,630	3.62
2009	50,256	205,557	4.09
2010	43,606	148,293	3.40
2011	38,879	170,308	4.38
Growth (%)	4,35	3,74	10

Sources: BPS Statistics Indonesia and Directorate General of Food crops 2003, 2005, 2008, dan 2012

In average, most of the land in Bone is classified as dryland area with cropping intensity of CI 100 about 30% of the total land area, CI 200 about 30% of the total land and CI 300 about 35% of the total area. Farm input such as seed, fertilizer etc follows the recommendation.

## Economic Analysis of Hybrid Maize Production

The production cost of hybrid maize is higher than composite or local varieties in terms of seed price and fertilizer requirement. The cost of hybrid maize production

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Tabel 5. Cropping pattern and cropping intensity of the land in Bone Regency, South Sulawesi.

Issue	Kwantity	%
Production System:		
Dry land	20	100
Lowland	0	0
Croppyng Index		
1 x per years	3	30
2 x per years	6	30
3 x per years	11	55
Soil analysis		
Available	NA	-
Non available		-
Areal planting/KK (ha)		
Whead season		0,90
Dry season		0,86

Source: Zainiet al. 2010

account for approximately 30% of the total production cost. Most of the cost used to afford certified hybrid seed and fertilizer. Total cost of production was Rp 3,551,800 whereas the revenue is about Rp 7,385,000. Thus the use of hybrid maize in Bantaeng could benefit the farmers of about Rp 3,833,120. B/C ration gained from the production system was 2.08-that proven that the use of hybrid seed in maize production would benefit farmers.

In case of Bone regency, previous research indicated that applying site specific nutrient management would significantly reduce the fertilizer cost. Nutrient manager is Site specific nutrient management (based on crop requirement as well as indigenous nutrient status of soil) In addition, nutrient manager will incorporate organic and in organic fertilizer application.

Table 6. Cost of production, value of production and benefit the farm level in hybrid maize, Bantaeng, South Sulawesi.

Description	Value/unit	Unit price (Rp)	Total value (Rp)
Cost of production			
Seed (kg)	15	40.000	600.000
Fertilizer (kg)			
- Urea	216.2	1.600	345.920
- Phonska	86.7	2.300	199.410
- ZA	107.7	1.500	161.550
- KCl	56.3	2.300	129.500
Herbicide (liters)	3	50.000	150.000
Cultivation area (ha)	1	441.000	441.000
Organic fertilizer (kg)	1,000	720	720.000
Cost of harvest (ha)	1	804.500	804.500
Sub total			3.551.880 (a)
Revenue			
Grain production (kg)	3.500	2.110	7.385.000 (b)
Benefit			
Revenu (b-a)			3.833.120
R/C Ratio			2.08

Sources: Nawiret al.2010

Table 7. Analysis of partial benefits of hybrid maize farming based on farmers and recommendation nutrient manager in Cina Village, Bone Regency, South Sulawesi, 2010.

Description	Farm level
Seed (kg)	15
Price of seed	45.000
Production grain (t/ha)	5,708
Price in the farm level (Rp/kg)	2.000
Revenue (Rp/ha)	11.414.000
Cost of seed (Rp/ha)	675.000
Cost of fertilizer an organik (Rp/ha)	355.000
Cost of fertiltzer organik (Rp/ha)	0
Total cost (Rp/ha)P	1.030.000

Source: Zaini, et al. 2010

From the result of the research at the farm level using production cost (seed, organic fertilizer) with the total cost being based Rp1,030,000. So using NM recommendation with total cost Rp 2,047,500 per hectare. Revenue seed and fertilizer cost benefits the farm level Rp10,384,000 and using NM Rp12,680,500. Than those the advantage of using NM increase of 22%.

## Conclusion

Bantaeng has successfully disseminating hybrid maize to the farmers that contribute to enhance maize production in the region. The productivity of maize in Bantaeng was 5.9 t/ha, higher than national average productivity (less

than 4.3 t/ha). Farmers in Bantaeng grew local varieties for home consumption only, while for commercial purposes they grew hybrids or recycled hybrids. The use of hybrid seed in maize production have been tested in two regencies, Bantaeng and Bone respectively. The result indicated that the cost of hybrid maize production account for approximately 30% of the total production cost. Most of the cost used to afford certified hybrid seed and fertilizer. Total cost of production was Rp 3,551,800 whereas the revenue is about Rp 7,385,000. Thus the use of hybrid maize in Bantaeng could benefit the farmers of about Rp 3,833,120. B/C ratio gained from maize production was 2.08. In addition to Bone, total cost production was 1,030,000 with the revenue of about 10,384,000. B/C ratio gained from maize production was 7.12, indicating that the use of hybrid seed in maize production would benefit farmers.

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