

# **Economics of Potato Production in Africa: A Comparative Analysis of Nigeria and Kenya for 2015**

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## **Abstract**

*This study compared Irish potato production under the Potato Initiative Africa Project (PIA) by farmers in Kenya and Nigeria so as to determine the profitability of its production whereby the best yielding seeds for Nigeria (Marabel) and the available seeds in Kenya (Shangi, Caruso, Connect and Jelly) were compared in terms of costs and returns. A multi stage sampling was adopted for the studies where both study areas were selected purposively, and a random selection of farmers for the Focus Group Discussion (FGD) conducted. The results revealed that land sizes used for potato production under the PIA project for both countries are 0.10, 0.13, 0.10, 0.03, and 0.50 hectares for Jelly, Caruso, Connect, Shanghi, and Marabel respectively. Marabel utilizes more land size (0.5ha) and also records the least yield of 8 tons/ha as compared to Jelly (26.25 tons/ha), Caruso (16.56 tons/ha), Connect (22.29 tons/ha) and Shanghi (27.34 tons/ha). It is also interesting to reiterate the fact that Nigerian Marabel had the highest production cost and utilized more family labour, but despite that, Marabel is more profitable than all the other varieties. It is concluded that Irish Potato production in both countries is profitable and farmers from both countries can learn from one another to enhance the enterprise. Some of the recommendations raised includes, government and related stakeholders should develop relevant and appropriate policies that will ensure subsidized inputs reach farmers on time, and that funding should be provided to research institutes to operate in their fullest capacity and become committed to finding a lasting solution to the deadly potato blight disease.*

**Keywords:** Returns, livelihood, potato, profitability

## **Introduction**

Potato has been an important commodity to farmers. It is grown to substitute staple commodities and also adds to the household economy through increased income. It matures in about 80-90 days, compared to other tuber crops; its short maturity makes it possible to be grown throughout the year under both rainy and irrigated systems (Okonkwo, 1992). According to International Potato Centre (IPC, 2015), it is the third most important crop in the world after Rice and Wheat in terms of human consumption. In Africa, Nigeria and Kenya are among the top ten producers of potato. Farmers in these countries plant it as a source of securing more income, which has resulted to an

increase in the land size where potato is been cultivated over the years.

In Nigeria, production has increased from 838 metric tons (MT) in 2006 to 1246.38 MT in 2016 while land area cultivated has also increased from 266.00 (000ha) to 333.10 (000 Ha) for same period (FAO, 2016). Nigeria also has the largest area of cultivated land for Irish potato in Africa, and also the 6<sup>th</sup> in terms of production output. Table 2 indicated the growth pattern of Irish potato cultivation in Nigeria, unlike other African countries the increase in yield in Nigeria as a result of extensive land use FAO (2016).

Table 2 (appendix 2) also indicates the abundance of agricultural land in Nigeria

which has probably led to over utilization of land because, farmers in Kenya used almost half of the land utilized by farmers in Nigeria, yet they manage to produce more than their Nigerian counterparts. The production of Irish potato in both countries and in particular Nigeria is characterized by the use of traditional production technology that includes the use of poor quality seeds, lack of modern storage facilities and the use of traditional production equipment's. The problem has been escalating day by day due to inadequate training and technology transfer, low productivity of Irish potato which imbalances the exports and imports ratio (60,000:30,000 tons), weakens business relationship between local producers and processors, and also limit the availability of healthy and suitable seed varieties (Ojo, 2005; Sylvanus and Micheal, 2014).

It is in this regards that the Potato Initiative Africa/Gesellschaft für Internationale Zusammenarbeit Intervention (PIA/GIZ) project was brought upon to redress the anomaly. PIA is a German-based intervention that was funded by GIZ which literally means German Corporation for International Cooperation. PIA targets small-scale Irish potato farmers to help raise their income and livelihood through the provision of financial and advisory services such as the manufacture of modern storage facilities in the selected areas, provision of certified /improved seeds, linking farmers to marketing channels where good prices are offered for produce. KE5NY and NG4PL are the unique identifiers of the various farms in the two countries, KE5NY stand for farm number 5 in Nyandarua county, Kenya while NG4PL means farm number 4 in Plateau State Nigeria. It therefore becomes of importance to all stakeholders in the Irish potato value chain to know the cost implication of producing Irish potato under the PIA project in Nigeria and Kenya. Also, the findings of this research would help farmers from both countries in making important rational decisions during production process which might help them in maximizing profit

### Methodology

The comparison focused only on farmers under the PIA intervention. The Nigerian farms are located in Plateau State, because it accounts for almost 95% of Irish potato production. Plateau State lies within North Central geopolitical zone of Nigeria with an altitude of 1200m and average annual rainfall of 1400mm. Temperatures range between 15 – 30°C all year around (FMARD, 2015).

The Kenyan farm was located in Kipipiri village, Nyandarua County in the centre of Kenya. It has an average elevation of 2,238 m with an annual rainfall of 1500mm (Muthoni et al., 2013). The conditions of both countries made it feasible for the potato to thrive well.

Multistage sampling was adopted for the study. The first stage involves the purposive selection of Nigeria and Kenya because they are among the largest Irish potato producing countries in Africa. Secondly involves the purposive selection of Plateau state in Nigeria and Nyandarua county in Kenya due to their contribution in potato production in the two countries. Final stage, involves the random selection of 5 farmers among the PIA participating farmers list for a focus group discussion. Two FGD's were conducted in each country for the project beneficiaries, making a total of four FGD's. The potato varieties compared are Jelly, Caruso, Connect and Shanghi for Kenya and Marabel for Nigeria. In the case of Kenya Jelly, Caruso and Connect are not originally from Kenya but are brought to Kenya through PIA and are of certified origin while Shanghi is a local seed of Kenya which was cleaned and certified. Marabel was also brought to Nigeria and is a certified seed.

The data collected was subjected to cost concept analysis to come up with the profit of Irish potato production in both countries. While some of the qualitative data captured during the FGD's were used as a basis for supporting the findings of the study. The model used for the for the cost concept analysis is shown as:

$$\text{Gross Revenue (United States Dollar (USD) Per Ha)} \\ - \text{Total Costs (USD per Ha)} = \text{Profit}$$

Where:

Gross revenue = total output (kg) x unit price (USD)

Total costs = Total direct costs+ operating costs + other costs

Where:

Total direct costs = establishment costs (seeds, crop insurance, crop protection and fertilizer costs)

Operating costs = machinery costs (repairs, depreciation) + total labour costs (hired and family labour) + fuel costs (fuel, other energy costs) + contractor costs

Other costs =land (rent cost, opportunity costs) +building costs (repairs, depreciation, finance) + miscellaneous (office, farm advisory, farm insurance, farm tax, accounting)

Note: The cost concept model is more like the farm budgeting analysis, but the cost model employs the use of opportunity costs to get value for fixed items used. For the exchange rates, the 2015 average exchange rates of \$1 =N198 and \$1 = 101KES were used.

## Results and Discussion

Figure 1 shows the proportion of land utilized for cultivating potato in both countries, Jelly, Caruso, Connect and Shangi for Kenya has 0.10, 0.13, 0.10, and 0.03 ha respectively while Marabel of Nigeria is cultivated on 0.50 ha. This shows that farmers in Nigeria devote more land to Irish potato production than Kenya. With regards to yield, Jelly has 26.25 tons/ha, Caruso (16.56 tons/ha), Connect (22.29 tons/ha) and Shangi (27.34 tons/ha). Nigerian farmers recorded the least in potato output with 8.00 tons/ha on 0.5ha. The low yield in Nigeria could be as a result of serious infestation of blight which greatly affect potato yield in 2015, resulting in a significant number of farmers to experience lower yield than average and in extreme cases zero harvest (Hir, 2016). The result is in line with the findings of Jwanya (2014) who reported that over 41.67% of Irish potato farmers cultivate Irish potato in land area ranging between 0.1-0.5ha.

Crop establishment costs are all costs resulting from procurement of seeds, fertilizer and all costs related to crop protection such as fungicides, herbicides, and insecticides. From figure 2, Marabel of the NG4PL farms has the highest cost for seed procurement with 354.04 USD/Ton. Caruso of KE5NY follows with \$71.47/ton. The least cost was recorded for Shangi at \$17.32/ton.

Nitrogen cost along the varieties also varies with Marabel having the highest cost per ton (\$9.16/ton). The difference between the varieties in terms of nitrogen cost is not so large, the highest of \$5.94 /ton for Caruso and the least is \$3.60/ton for Shangi. Farm NG4PL records the highest cost per ton for phosphorous and potash, having \$8.56 and \$16.38 respectively. Caruso follows with phosphorous and potash cost as \$4.03 and \$9.55/ton respectively. The least cost for Phosphorous and Potash was recorded for the Shangi variety having \$2.44 and \$5.78/ton respectively. By implication, farmers in Nigeria spent more money to procure fertilizer than Kenyan farmers and as a result spend more on production.

With regards to Fungicides, farmers in Kenya spent more than their Nigerian counterparts, the highest for Kenyan farms was recorded for Caruso with \$18.10/ton and the least was Shangi having \$10.97/ton. The least for Kenya is still more than the Nigerian farms with \$10.37/ton. This can be justified by the fact that, Kenyan farmers adopt preventive methods of Potato Blight infestation as a result, they spray more than their Nigerian counterparts who only adopt the resort to the control methods of blight infestation when some traces of infestation has been noticed (Agri benchmark, 2016).

Figure 3, gives the chart of operating cost along the farms. Operating cost includes costs for hired labour, the opportunity cost of family labour, depreciation on fixed assets etc. Nigerian farms recorded the highest in terms of hired labour cost having \$62.84/ton. The difference for the Kenyan farmers for Shangi, Connect and Jelly is not large.

Caruso recorded the highest for Kenyan farms with \$40.69/ton. In terms of contractor cost, this is mostly not so common in Nigeria and it involves seeking contractor's services for some of the farm operations such as ploughing, harrowing or ridging. Nigerian farmers do most of their work through manual hired labour with little family labour to supplement. This is probably why NG4PL has the least in terms of family and contractor costs with 5.31 and 7.59 USD/Ton respectively. For the KE5NY farms, Caruso recorded the highest for Family and contractor costs with \$10.65 and \$34.30/ton respectively. While Shangi recorded the lowest for family and contractor costs having \$6.45 and \$20.78/ton respectively.

This implies that under the PIA intervention, Kenyan farmers are more of practicing crop production with modern tools than their Nigerian counterparts (Agri benchmark, 2016). Interviews with the farmers indicated their preference for utilizing manual labour than mechanized labour, in addition to their lack of financial strength was to also support the rural youths in having work to do and be paid than utilizing the mechanized means thereby leaving their rural youths job less.

Figure 4 shows the key cost element for all the farms. Key cost elements involves direct, operating and land costs. For the year in study, Marabel (NG4PL) recorded \$398.51/ton which is the largest in direct costs compared to all other farms, followed by Caruso (KE5NY) with \$111.16 /ton and the least was recorded for Shangi (KE5NY) with \$41.37/ton. For operating costs, Caruso had the largest (\$85.70 /ton), followed by Marabel (\$75.78/ton) and the least was recorded for Shangi (\$51.92/ton). Land cost in the developing nations for example Africa is very negligible, some even use land free of charge, this is because of the abundance of land in the region and also the people or farmers are too poor to cultivate their whole land holdings.

Despite the high cost of producing potato in Nigeria, the gross revenue obtained was reasonably larger than all the varieties cultivated in Kenya. The

cleaned Shangi of Kenya recorded a gross revenue of \$214.61/ton and was able to pay for its cash cost and depreciation. Followed by Caruso and Connect with \$204.39 and \$153.30 /ton respectively. Jelly potato variety couldn't pay for its cost of production, as a result, it had a negative margin. Farmers in Nigeria were able to accrue such gross revenue because the PIA project linked them with processors that paid a flat rate of \$50.19 per 50kg of potato bag, as compared to the price of \$9.83, \$7.37 and \$10.52 per 50kg of Jelly, Caruso Connect and Shangi respectively. This was an advantage for the Nigerian farmers, and that was why despite realizing the high production costs, they were able to record the highest profit margin.

### **Conclusion and Recommendations**

Base on the findings of this study, It is concluded that Irish potato production is a profitable venture though, can be more profitable if government and interested stakeholders could work closely with farmers and develop policies and other motivational packages that will encourage youths and public office holders to invest in Irish potato production especially in the Nigerian case, while the Kenyan government together with National Potato Council Kenya (NPCK) should link farmers to buyers so that better prices will be realize for their produce. From these findings, the following are recommended;

1. The Nigerian farmers and the Government can copy system of production from the Kenyan farmers especially with regards to the frequency of spraying against the deadly blight disease while the government can learn strategies for making farming become more youth driven.
2. The government needs to come up with a policy that will ensure prompt delivery of subsidized inputs in Nigeria. The government of Kenya has shown serious commitment through providing modern production equipment and also creating a suitable environment for investors in Kenya,

- this effort has yielded a positive result. Therefore, Nigerian government should replicate that and develop appropriate policies that will not only make Irish potato farmers to cultivate more farm lands, but to also motivate youths and public office holders to come into the farming sector.
3. The Government of Kenya and some private stakeholders commission the National Potato Centre of Kenya (NPCK) should serve as a body that will provide all forms of proven facts and stand as mediators between Irish potato farmers and other actors of the potato value chain. In addition, they should conduct research in collaboration with local and international bodies to make sure problems of Irish potato farmers are solved in the best possible way.
  4. As part of the benefit derived from NPCK, potato blight has been reduced to its minimum and they no longer see it as a problem of much concern. Therefore, the Nigerian Government should replicate this through injecting more funds to the National Root Crop Research Institute (NRCRI) to enable them function in their fullest capacity and to conduct series of researches be it with local or foreign investors and find a lasting cure to the deadly potato fungus and also extend new systems of production to Irish potato farmers.
  5. Farmers should be encouraged to form groups, as this will go a long way in providing solution to the problem of late delivery of subsidized inputs, difficulties in accessing government loans, and they can easily report to relevant institutions on all problems that prove difficult to be solved at group level.
  6. NPCK should conduct research to identify buyers and link them to Irish potato farmers in Kenya just as in the case of Nigeria. This will ensure that farmer enjoy premium prices for Irish potato in Kenya as farmers from the PIA project are still enjoying such benefit in Plateau state.
  7. Further research should be conducted on the impact of PIA intervention on the livelihoods of potato farmers in both countries. If the results turn out positive, they can give room for replication of the intervention to capture other staple crops in both countries.

### References

- Agri Benchmark (2016). *Economic assessment of agricultural production systems under potato initiative Africa in Kenya and Nigeria*. A Report to GIZ (June).
- Federal Ministry of Agriculture and Rural Development (2015). Global programme green innovation centres for the agriculture and food sector. Accessed from [www.share4dev.info](http://www.share4dev.info) on 20 November 2017.
- Food and Agriculture Organization (2018). Database on crop area and production estimates. Retrieved from [www.fao.org](http://www.fao.org) on 22 September 2018.
- Food and Agriculture Organization (2008). International year of the potato. Accessed from [www.fao.org](http://www.fao.org) on 14 September 2016.
- Hir, J. (2016). Potato cultivation threatened by endemic blight in Plateau. *Daily Trust* (25 August).
- IPC (2015). Potato facts and figures. Retrieved from <https://cipotato.org> 14 March 2016.
- Jwanya, B.A., Dawang N.C., Masha I.M. and Gojing B.S. (2014). Technical efficiency of rain-fed Irish potato farmers in Plateau State, Nigeria. A stochastic frontier approach. *Developing Studies*, 4(22): 34-39.
- Muthoni J., Shimelis H. and Melis R. (2013). Potato production in Kenya. *Farming Systems and Production Constraints*, 5(5).
- Ojo, A.M. (2005). Economic analysis of irish potato production in Plateau State. MSc thesis, Department of Agricultural Economics and Rural Sociology, ABU Zaria.
- Okonkwo, J.C. (1992). Irish potato production in Nigeria. Training Workshop Paper, NRCRI, Vom, Nigeria.
- Sylvanus, M.A. and Micheal, K. (2014). Promotion of potato value chain in Nigeria. Economic Development for Peace and Stability in Plateau State, Nigeria. Retrieved from <https://daserste.ndr.de> on 23 September 2018.

**Table 1: Top ten potato producers in Africa and the area harvested**

<i>Countries</i>	<i>Production (MT)</i>	<i>Land Area (000 Ha)</i>
Egypt	5029.02	184.59
Algeria	4782.69	156.20
South Africa	2150.84	59.58
Morocco	1743.62	59.44
Kenya	1335.88	145.97
Nigeria	1246.38	333.10
Malawi	1043.34	63.04
Ethiopia	921.40	66.92
Rwanda	751.28	106.24
Angola	721.48	122.47

Source: FAO, 2016

**Table 2: Area harvested and average production of Irish potato in Nigeria and Kenya**

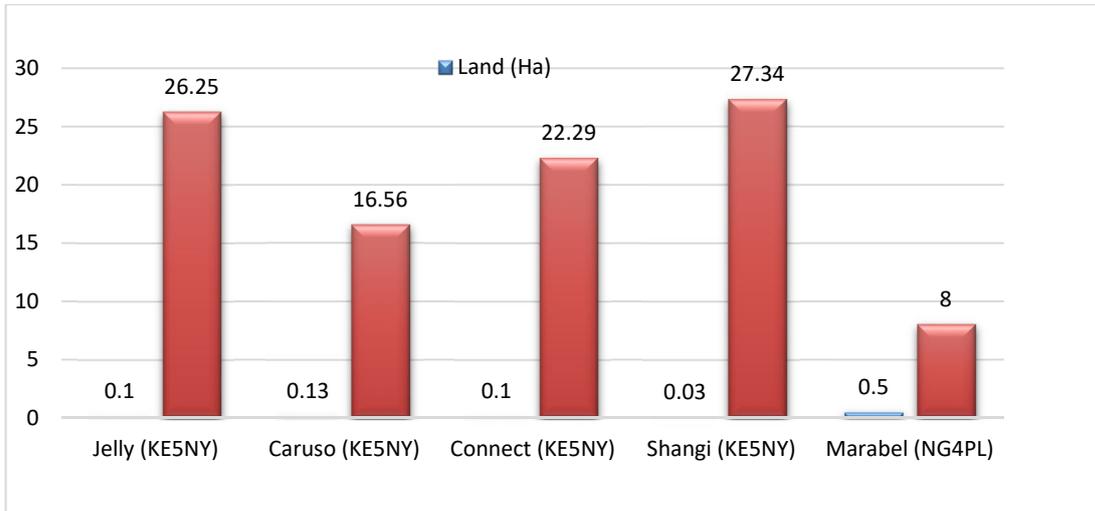
<i>Nigeria</i>			<i>Kenya</i>		
<i>Year</i>	<i>Area (000 Ha)</i>	<i>Production (MT)</i>	<i>Year</i>	<i>Area (000 Ha)</i>	<i>Production (MT)</i>
2006	266.00	838.00	2006	120.75	2415.08
2007	269.00	662.00	2007	109.61	2192.28
2008	263.00	1105.00	2008	135.00	2900.00
2009	250.00	1000.00	2009	120.25	2299.09
2010	265.25	1021.46	2010	121.54	2725.94
2011	307.83	1072.29	2011	123.39	2365.26
2012	299.43	1085.96	2012	143.33	2915.07
2013	308.04	1126.07	2013	152.01	2192.89
2014	316.53	1166.17	2014	115.60	1626.03
2015	324.88	1206.28	2015	133.53	1963.50
2016	333.10	1246.38	2016	145.97	1335.88

Source: FAO, 2016

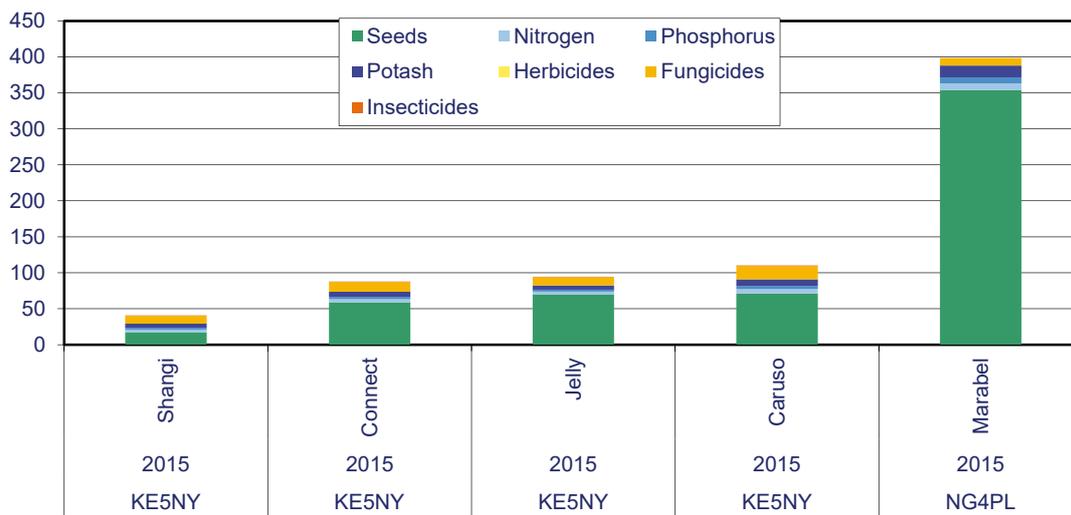
**Table 3: Key figures on Nigerian potato production and consumption**

<i>Parameters</i>	<i>FAO (2008)</i>	<i>NRCRI (2010)</i>	<i>Small Consult (2012)</i>
Land Area Cultivated	263,000 ha	295,000 ha	300,000 ha
Annual Production	1,105,000 tons	1,475,000 tons	1,500,000 tons
Average Yield Per Ha	4.2 tons	5 tons	5 tons
Potato Consumption in Nigeria	502,000 tons	1,030,000 tons	1,175,000 tons
Annual Consumption Per Capita	3.3 kg	6.5 kg	7 kg
Total import (ware, seeds and processed potatoes)	40,000 tons	60,000 tons	No data available
Total export	No data available	30,000	No data available

Source: FAO, (2008), NRCRI, (2010) and Small Consult (2012)



**Figure 1: Land (Ha) and output (tons) for Kenya and Nigeria's PIA farms**



**Figure 2: Crop establishment cost (\$/ton)**

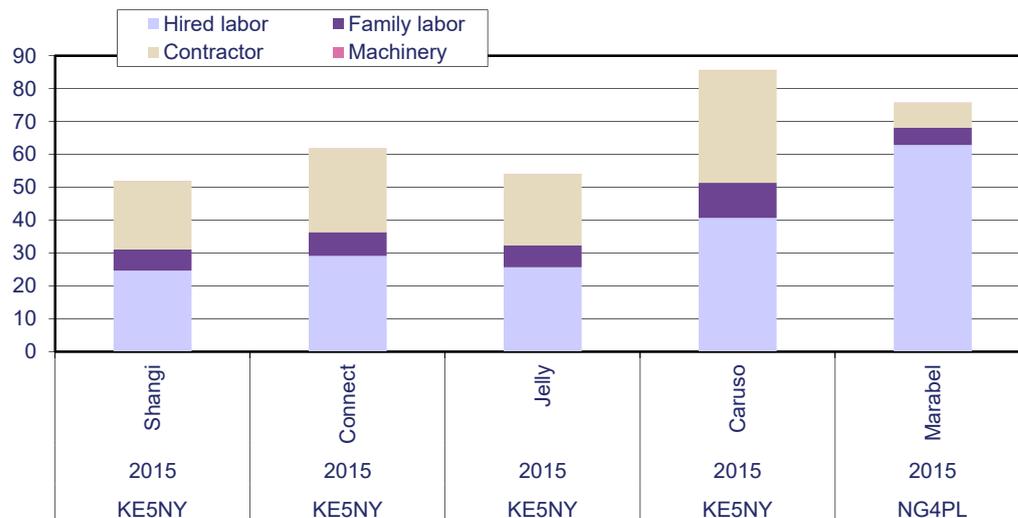


Figure 3: Operating cost (\$/ton)

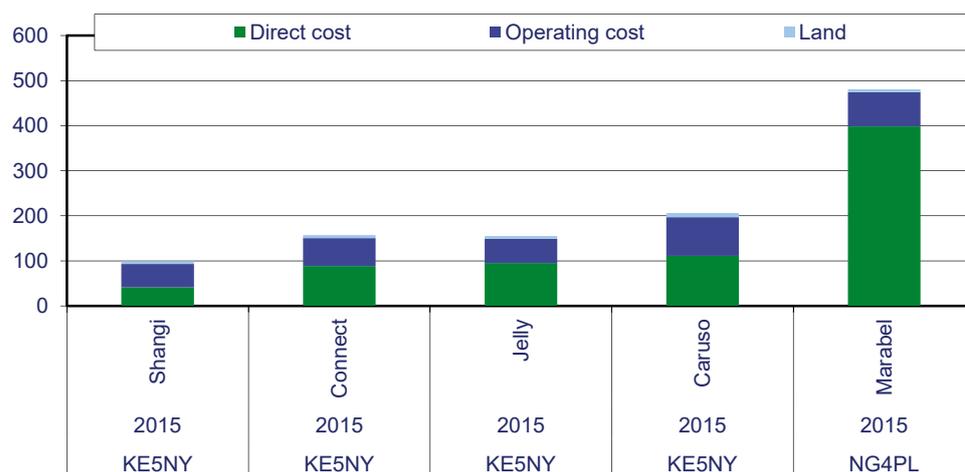
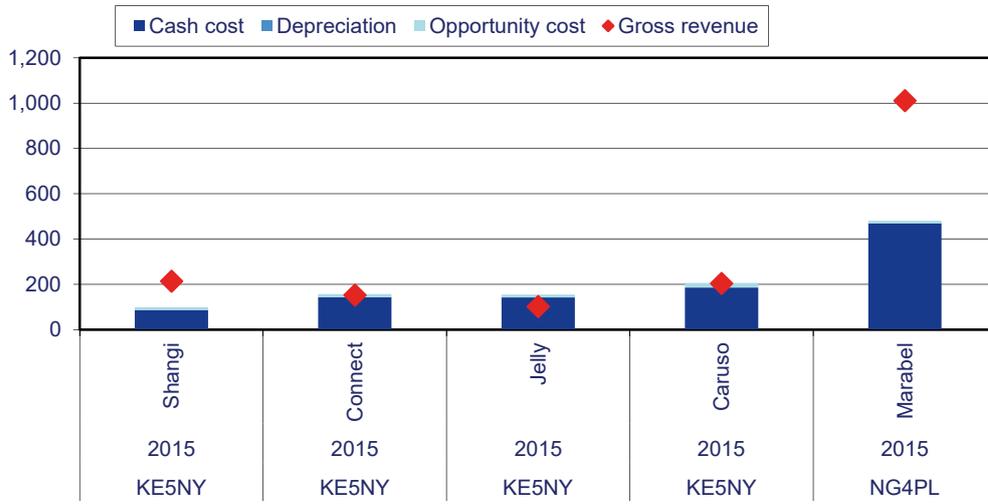


Figure 4: Key cost elements (\$/ton)



**Figure 5: Profit obtained for potato for the 2015 cropping year (\$/ton)**