

Research Application Summary

**Why do smallholder farmers fail to use certified seed potato? The case of Nnakuru county, Kenya**

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**Abstract**

Potato (*Solanum tuberosum* L.) is the second most important staple food crop in Kenya, coming second to maize. It has the potential to contribute greatly to national food and nutrition security, yet the country still suffers from food insecurity. The average yields of potato in Kenya are relatively low at 8 tonnes per hectare, compared to 40 tonnes per hectare in America and Western Europe. One of the leading causes of low yields is the use of poor quality certified seed by farmers. This study assessed the factors preventing smallholder potato farmers in Nakuru County from using certified seed. A cross-sectional survey research design was used to carry out the study in three purposively selected administrative wards of Njoro and Kuresoi North sub-counties. Purposive and cluster sampling methods were used to select 175 respondents. A researcher administered semi-structured questionnaire was used by trained enumerators to collect data which was analysed using SPSS. The findings revealed that majority of the respondents (66%) knew about certified seed potato, but only 26% used the certified seed. The main reasons for failure to use certified seed potato were; high cost of the seed reported by 39.6% of respondents, followed by unavailability of seed (23.6%), and lack of production knowledge (20.8%). About 15% of respondents reported not knowing where to get the seed. The study recommends a multi-pronged approach to promoting the use of certified seed potato, through linkage to credit facilities, increased and decentralized seed potato production and provision of adequate extension services to potato farmers.

Key words: Food security, Kenya, Nakuru, potato seed, smallholder farmers, *Solanum tuberosum*

**Résumé**

La pomme de terre (*Solanum tuberosum* L.) est la deuxième culture alimentaire de base au Kenya, après le maïs. Elle a le potentiel de contribuer grandement à la sécurité alimentaire et nutritionnelle nationale, pourtant le pays est toujours en proie à l'insécurité alimentaire. Les rendements moyens de la pomme de terre au Kenya sont relativement faibles, soit 8

tonnes par hectare, contre 40 tonnes par hectare en Amérique et en Europe occidentale. L'une des principales causes de ces faibles rendements est l'utilisation de semences certifiées de mauvaise qualité par les agriculteurs. La présente étude a évalué les facteurs qui freinent l'utilisation de semences certifiées par les petits producteurs de pommes de terre du contré de Nakuru. Une enquête croisée a été menée dans trois districts administratifs sélectionnés à dessein dans les sous-contrés de Njoro et Kuresoi North. Des méthodes d'échantillonnage sélectif et en grappe ont été utilisées pour identifier 175 répondants. Des énumérateurs formés ont utilisé un questionnaire semi-structuré élaboré par le chercheur pour collecter les données qui ont été analysées à l'aide de SPSS. Les résultats ont révélé que la majorité des répondants (66%) connaissaient l'existence des semences certifiées de pomme de terre, mais seuls 26% en utilisaient. Le coût élevé des semences, indiqué par 39,6 % des répondants, suivi de l'indisponibilité des semences (23,6 %) et du manque de connaissances en matière de production (20,8 %) sont les principales raisons de cette non-utilisation. Environ 15 % des répondants ont déclaré ne pas savoir où obtenir les semences. Cette étude recommande une approche à plusieurs volets pour promouvoir l'utilisation de semences de pommes de terre certifiées, à travers des mécanismes de crédit, une production accrue et décentralisée de semences de pommes de terre et la fourniture de services de vulgarisation adéquats aux producteurs de pommes de terre.

Mots clés: Sécurité alimentaire, Kenya, Nakuru, semences, pomme de terre, petits exploitants, *Solanum tuberosum*.

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## Introduction

Although agriculture is a key sector in Kenya's economy, contributing almost 30% to the GDP and providing employment and livelihood to over 80% of the rural population (Republic of Kenya, 2017), the country is yet to achieve food security for its 40 million people (Laibuni *et al.*, 2018). In line with the Sustainable Development Goals (SDGs), the Kenyan Government has put food security at the centre of its development agenda, being one of the four pillars in its Big Four Agenda. The other pillars are universal health care, affordable housing and manufacturing.

Potato *Solanum tuberosum* is the second most important staple food crop in Kenya, coming second to maize (Wangeningen UR, 2013). It has the potential to contribute greatly to national food and nutrition security, and is one of the three food crops being promoted under the food security pillar of the Kenya Government's Big Four Agenda.

Nakuru is one of the leading agricultural region in Kenya. Potato is important as a food crop and income earner in Nakuru, and is being promoted as one of the priority agricultural value chains in the County. The crop is also important in Nakuru County as a food crop and source of income, with the County Government promoting potato as one of its priority value chains (Republic of Kenya, 2013). The main potato producing sub-counties are Molo, Kuresoi North, Kuresoi South, Njoro and Nakuru East.

The potato sector in Kenya is dominated by smallscale farmers with 90% having holdings of less than 0.2 hectares, The average yields of potato in Kenya are relatively low at an average of 8 tonnes per hectare, compared to yields in other parts of the world such as America

and Western Europe where yields of up to 40 tonnes per hectare are realised (Wageningen, 2013). This has been attributed to many factors, but one of the leading causes being the lack of good quality seed for farmers or inadequate supply of certified seed (Muthoni *et al.*, 2010). Hence this study sought to assess the use of certified seed potato used among smallholder farmers in Nakuru County and identify the factors that prevent smallholder farmers from using certified seed.

## Methodology

The study used a cross-sectional survey research design. It was carried out in three purposively selected administrative wards of Njoro and Kuresoi North subcounties, based on the prevalence of potato farming in the wards. A sample of 175 farmers were selected through purposive and cluster sampling methods whereby the respondents were picked from active farmer groups that were engaged in potato farming. Two administrative wards were purposively selected from each sub-county, based on the existence of farmer groups that were actively involved in potato farming. A total of 175 respondents were selected from the four wards. The distribution of the respondents was as indicated in Table 1.

**Table 1. Distribution of respondents by sub-counties and wards**

Subcounty	Ward	Frequency	Percent
Njoro	Mau Narok	56	32.0
	Mauche	32	18.3
	Sirikwa	32	18.3
Kuresoi North	Kamara	55	31.4
	Total	175	100.0

A researcher-constructed and administered semi-structured questionnaire was used to collect data. Validity of the questionnaire was established through careful consideration of all the items to ensure they adequately covered the objectives. In addition, two experts in agricultural extension and survey research methodologies were involved in the construction and scrutiny of the questionnaire.

To ascertain reliability of the questionnaire, it was pilot tested with 24 smallholder potato farmers in Elburgon Ward of Molo Subcounty, which has similar agro-ecological conditions as the study area. Reliability of the questionnaire was established qualitatively. Data were collected by well trained enumerators who were supervised by qualified and experienced researchers. Statistical Package for Social Sciences (SPSS) Version 20 was used for data analysis. Data were analysed using frequencies and percentages, and presented in tables and graphs.

## Findings and Discussions

**Profile of the respondents.** Female respondents outnumbered the males as they constituted 61% of the sample. Only 40% of the females were household heads, compared to 98% of the males. Most of the respondents (53.2%) fell in the age category of 26 to 45 years, meaning they were fairly young and strong. The literacy rate was fairly high with only 4.6 percent

never having gone to school and 62% having attained primary education schooling. Three types of land ownership were reported, although these were not exclusive of each other. These were: own land with title deed, family land and rented land. Most of the respondents (56%) reporting owning the land that they cultivated, while almost a half used rented land. Farming was an important economic activity in the area, with 92% of the respondents reporting that it was their main source of income.

Potato was reported to be the leading crop by 65% of the respondents, followed by maize. Other crops grown were beans, peas and vegetables, among others. The acreage of potatoes ranged from 0.125 acres to 5 acres, with majority of the farmers having less than 2 acres. Most of the respondents were mixed farmers, and reported keeping livestock such as cattle, sheep, goats and chicken.

**Knowledge and use of certified seed potato.** The study sought to find out whether the respondents knew about certified seed.

Majority of respondents (66.1%) reported that they knew about certified seed, while those who did not know about certified seed was substantial at 33.9%. Awareness or knowledge of a technology or innovation is the first stage towards the adoption of that technology. The fairly high percentage of respondents who did not know about the existence of certified seed potato therefore points to a need for greater efforts towards sensitization of smallholder farmers. The respondents were also further asked whether they planted certified seed. Majority of them (74.6%) reported that they did not plant certified seed. It is clear that although over 60% of the farmers knew about certified seed, only a quarter of the farmers actually used certified seed.

**Types of seed potato used.** The respondents reported that they used several types of seed potato. These are summarized in Figure 1.

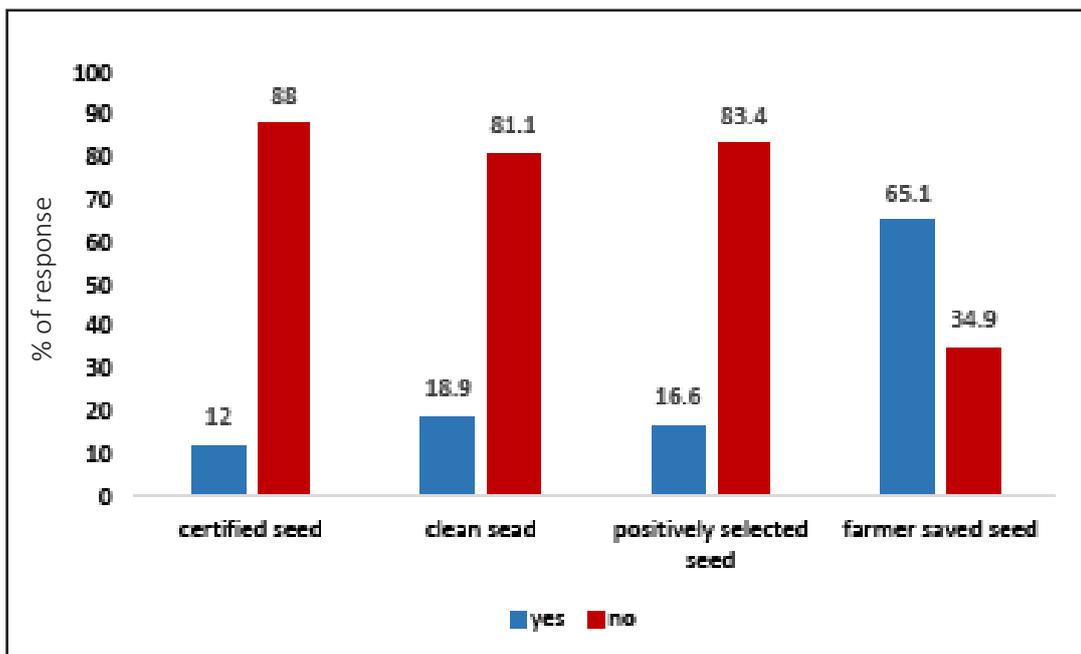


Figure 1. Types of seed potatoes planted by respondents

Only 12% of the respondents reported planting certified seed potato, 18.9% used clean seed potato, 16.6% used positively selected seed potato while 65.1% of the respondents being the highest reported using farmer saved seed potatoes. This shows that most of the potato production in Nakuru County is dependent on farm saved seed. These are usually associated with poor quality, low yielding capacity, and contamination with diseases such as bacterial wilt and late blight which lead to low yields and poor quality produce (Riungu, 2011). The findings agree with Muthoni *et al.* (2010) who reported that informal seed potato accounted for over 90% of the seed supply. Further, Ogola *et al.* (2012) reported that unregulated and informal seed marketing and distribution system dominated the potato sector in Kenya.

**Reasons for not using certified seed.** The respondents were then asked about the reasons why they were not using certified seed. The reasons given are presented in Table 2. These are further discussed below.

**Table 2. Reasons for not using certified seed potato (n=106)**

Reasons for not using _certified seed	Frequency	Percentage
Lack of seed	25	23.6
The seed is expensive	42	39.6
I don't know where to get seed	16	15.1
Lack of production information	22	20.8

The leading reason for not using certified seed potato was the high cost of seed, as reported by 39.6% of the respondents. This is so because many smallholder farmers are resource constrained. Given that a 50 kg bag of seed potato in Kenya is sold at an average price of KES 2500 (US\$), this translates to a cost that was way beyond the reach of many farmers. This finding agrees with what Ogola *et al.* (2012) found, that producer price was a major determinant of potato seed demand in Nakuru County. This is further supported by Laibuni *et al.* (2018) who found that high cost of farm inputs (including seed potato) were a major cause of low level of food crop supply, which has a negative impact on food security.

**Sources of funding of potato production.** This study further sought to find out about the sources of financing for potato farming. This was directly linked to the high cost of certified seed potato being a major challenge. The responses were as indicated in Figure 2. Most of the farmers (84%) relied on their own savings to finance potato farming. This finding agrees with Wageningen (2013) where it was reported that 75-80% of farmers prefer to use their own savings for potato farming largely because of cost. Other sources of financing potato farming were from family members (8%). The results also showed that very few of the respondents got finances for potato farming from Microfinance Institutions, SACCOs or banks.

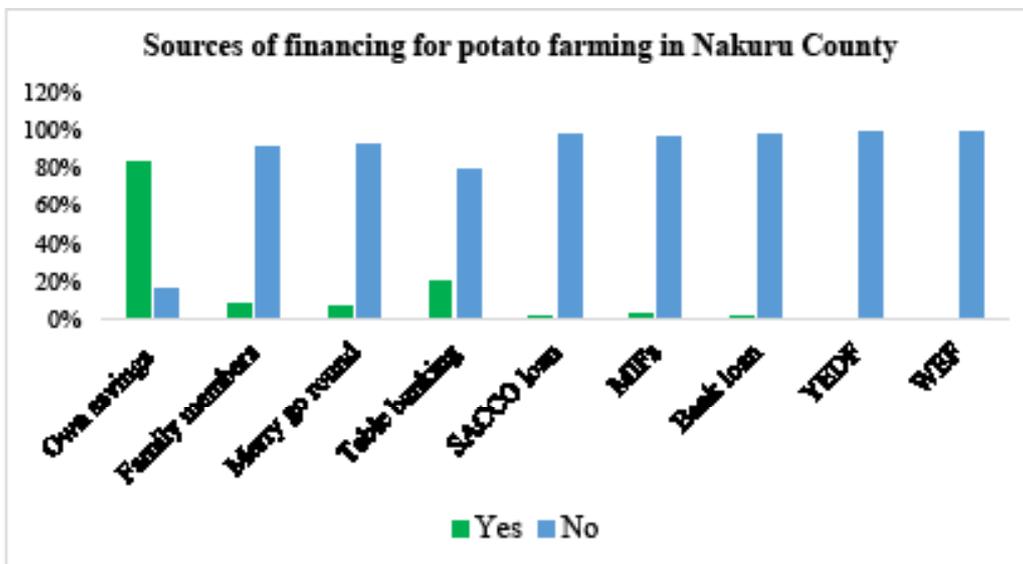


Figure 2. Sources of financing for potato production

The Youth Enterprise Development Fund (YEDF) and the Women Enterprise Fund (WEF) were hardly used by the respondents. These funds were put in place by the Kenyan Government and specifically targeted youth and women, as part of the efforts to promote their participation in businesses. The findings therefore indicate that there is a need for credit facilities to be provided to the farmers since most of them are smallholders with limited resources.

**Lack of seed or inadequate supply of seed.** The second important reason for not using certified seed potato was lack of the seed or inadequate supply of the seed. About 39% of the respondents reported that they lacked the seed or they did not know where to get the seed. This implies that availability of certified seed was a major hindrance. As a follow up on this, those who used certified seed potato were asked about where they sourced the seed potato. The findings were as indicated in Figure 3.

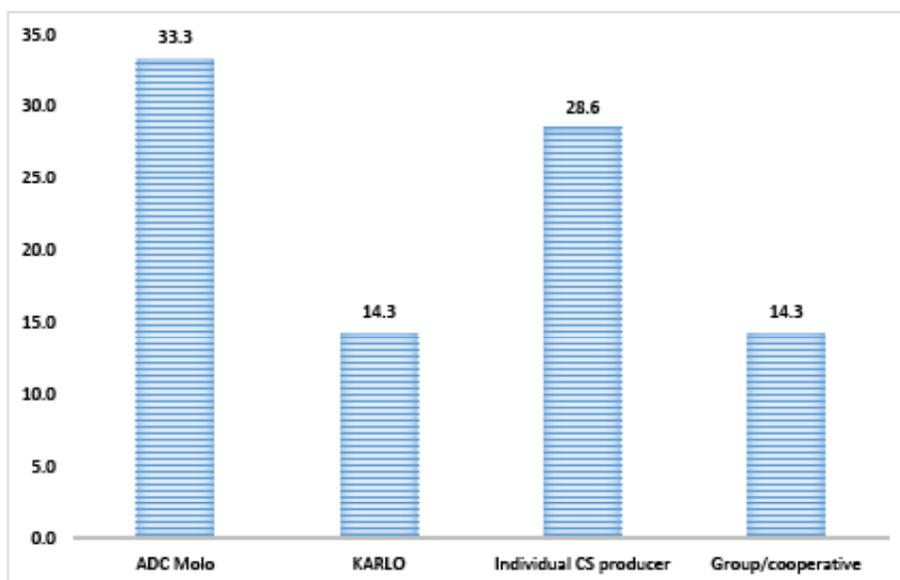


Figure 3. Sources of certified seed potato

The study revealed that there were several sources of certified seed. About 33% of the respondents who use certified seed potato reported getting their supply from the Agricultural Development Corporation (ADC) in Molo, Nakuru County. This was followed by 28.6% who got their seed from individual certified seed producers. About 14% reported sourcing their seed from the Kenya Agricultural and Livestock Research Organization (KALRO) in Njoro, and from farmer groups/cooperatives producing the seed. The fact that lack of seed was reported to be a major hindrance to the use of seed potato implies that although there were several sources of certified seed, these were not able to meet the farmers' demand. This is further compounded by the fact that 15% of the respondents cited the challenge of not knowing where to get the certified seed. This finding is supported by others who reported that inadequate seed supply or limited access to quality seed are major challenges for farmers (Muthoni *et al.*, 2010; Taiy *et al.*, 2016).

Inadequate seed supply was further exacerbated by the fact that the seed potato producers were not only few, but were not well spread out, meaning that many farmers had to cover long distances to get to the producers. This has an implication on the likelihood of a farmer using certified seed potato.

**Lack of production information.** Another important reason given for not using certified seed was the lack of production information, as reported by about 21% of the respondents. This is an indication that many farmers were aware of the need to have production information when planting certified seed, but were unable to do so because they lacked the requisite knowledge. As a follow up to this, the study explored the practice of crop rotation as one of the important good agricultural practices required in potato farming. Majority of the respondents (97%) planted potatoes more than once in a year, with 67% planting twice. Potato is a short season crop that matures in about three months, and can therefore be planted even three times in a year. However, the practice of crop rotation is key in ensuring that there is no build-up of pests and diseases. The practice of crop rotation was widespread, with about 94% of the respondents reporting that they were practicing crop rotation. Crop rotation has the potential to reduce diseases such as bacterial wilt and the farmers could have practised crop rotation because they had knowledge about good agricultural practices.

The respondents who practised crop rotation were asked about how frequently they rotated their crops. The responses are summarised in the Figure 4. Majority of the respondents rotated their potato crop after one or two seasons (43.3% and 42.8%, respectively). This is an acceptable frequency of rotation as per what is recommended. About 10% of the respondents rotated their potato crop after three seasons while only 1% rotated the crop after more than three seasons. They were also asked about which crops they rotated their potato crop with. Majority (69.2% and 61%) of the respondents rotated their potato crop with legumes (beans and peas) and cereals (mainly maize), respectively. About 15% rotated potatoes with leafy vegetables. A few reported rotating with fruits, root vegetables and pastures, but these were insignificant. These findings indicate that majority of the respondents were aware of the value of crop rotation as a good agricultural practice and were practising it.

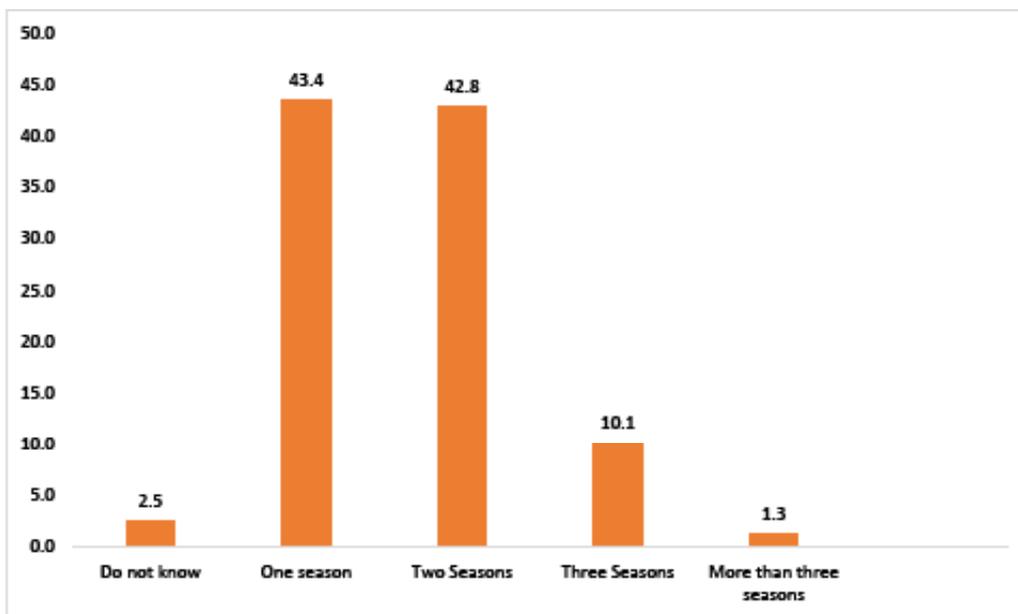


Figure 4. Frequency of doing crop rotation

**Frequency of acquiring new seed potato.** The respondents were further asked about how often they bought or acquired new seed. The responses were as shown in Figure 5.

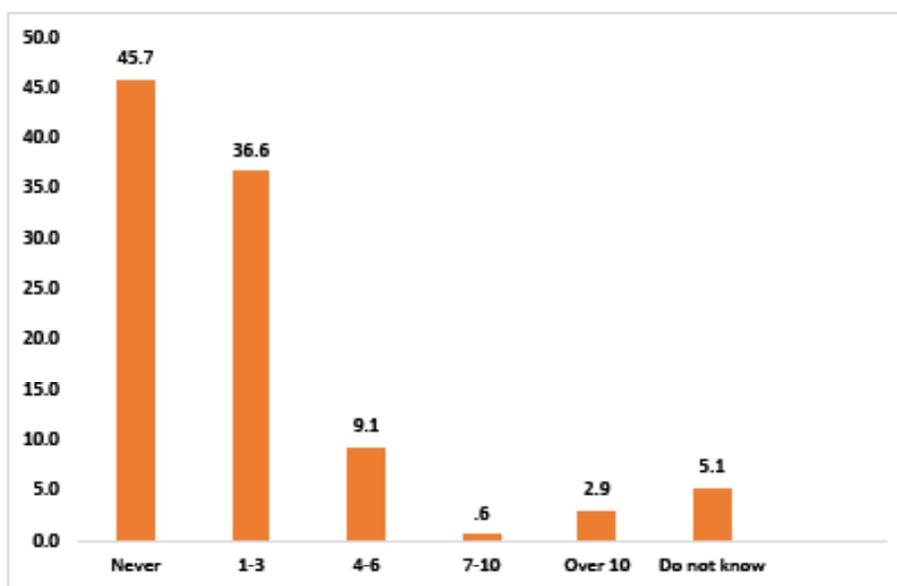


Figure 5. Frequency of seasons in which farmers buy or get new seed

Almost half or the respondents (45.7%) reported never renewing their planting material. A sizeable proportion (36.6%) however renewed after one to three seasons, which is an acceptable and recommended interval. It is interesting to note that almost a quarter of the respondents (23%) renewed their seed after four or more seasons, and some did not even know after how long they renewed their seed. Failure to renew the planting material may be due to ignorance but could also be due to the lack of good planting material.

## Conclusions and Recommendations

The use of certified seed potato among smallholder farmers in Nakuru County is low, as is the case in many parts of Kenya and in other developing countries. The major hindrances to the use of certified seed are high cost, unavailability of the seed and lack of production information. Enhancing the use of certified seed among smallholders will therefore require a multi-pronged approach. To make the seed more affordable to farmers they should be linked to credit facilities, and also encouraged to source credit services as groups. To increase seed availability, more producers should be encouraged to engage in potato seed production, and there should be decentralisation of the seed potato sources. Finally, smallholder potato farmers should be well supported by agricultural extension to ensure that they use best practices to maximise their production levels.

## Acknowledgement

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