MARKET ANALYSIS OF KALONJI

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Executive Summary

This paper investigates the current state of the international kalonji market and explores the market opportunities for Australian kalonji producers. It provides a baseline assessment of the global industry, using the limited information currently available, and identifies areas for further research to address gaps in market information. The study used secondary data sourced from credible databases including the Food and Agriculture Organization (FAO), World Trade Organization (WTO), United Nations International Trade Statistics Database (UN ComTrade) and the World Bank.

Kalonji (*Nigella sativa* L.) is a small herb which is also commonly known as black cumin, black seed or Nigella. Kalonji is indigenous to Egypt and India and is currently produced in different parts of the world including Southern Europe, Western Asia and North Africa. Kalonji seeds are used as a spice in both whole and grounded form. Kalonji oil extract has a long history for its medicinal and health food uses and is widely used in various value-added products e.g. skin-care products, for pickling or for flavouring foods from curries to cookies.

India, Pakistan, Syria, Turkey, Saudi Arabia, Egypt and Bangladesh are the major kalonji producers, however, comparative production data is not available in open-access online sources. Only data for Turkey has been sourced which shows that in 2018 it produced about 3,300 tonnes of kalonji with an average yield of 980kg/hectare.

Global trade data for kalonji is also not available in the literature. However, one market insight report estimated that by 2025, the kalonji oil market will be worth US$25 million per annum in the United States of America. Similar reports also predicted the future growth of kalonji in different European countries.

According to the limited available literature, the international trading price of Indian kalonji seeds ranges from US$ 2,258/tonne to US$2,750/tonne while the value of Egyptian kalonji seeds is US$2,900/tonne.

Kalonji seed is sown in early spring in the temperate zones and during the winter in tropical environments. Optimal conditions for planting are an ambient temperature range of 5 to 8 °C and 60% soil moisture.

The suitability of Australian conditions for kalonji production will be tested through the CRC for Developing Northern Australia 'Spicing Up the North' project. Pending proof of its suitability to Australian environments, its possible fit in Australian farming systems, future research will be required to understand the entire value chain, including investigating value-adding opportunities for health and medicinal products.

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Introduction

Kalonji (*Nigella sativa* L.) is a small herb belonging to the Ranunculaceae family (Malhotra, 2004). The term Kalonji is mostly used in Asian countries while it is commonly known as black cumin or black seed in the western world (Gilani, 2001). It is also widely known as Nigella.

While kalonji is produced in Southern Europe, Western Asia and North Africa, and it is believed that Kalonji is indigenous to Egypt and India (FAO & WHO, 2014). Historical records indicated that Kalonji has been cited in the Old Testament. Greek physicist Pedanius Dioscorides and Muslim scholar Al-Biruni also mentioned kalonji and its medicinal usage in their research (Gaur, 2017).

Kalonji grows about 30-60cm tall and it has fine divided, linear green leaves (Teshome &, Anshiso, 2019, Malhotra, 2004). The flowers are generally pale blue or white in colour with a variable number of sepals (Tuncturk et al., 2005). The fruit looks like an inflated capsule with 3-7 united follicles containing numerous seeds (Anshiso and Teshome, 2018).

The seeds are used as a spice in both whole and grounded form. Kalonji seed has a pungent bitter taste and aroma and it is used individually as well as an ingredient of spice mixture (Srinivasan, 2018). The kalonji oil extract has a long history for its medicinal and health food uses.

Kalonji is one of the most nutrient-rich herbs and research has been undertaken to validate its effectiveness as a medicinal herb (Yimer et al., 2019). Kalonji is a good source of protein, vitamins and minerals (Table 1). Kalonji is also a good source of fixed oil (vegetable oil that is not volatile), constituting about 26-34% linoleic acid and palmitic acid (Yimer et al., 2019).

Table 1. Chemical composition of kalonji seeds

Contents	g/100 g
Moisture	4
Protein	26.7
Fat	28.5
Carbohydrate	24.9
Energy value	1393 kJ/100 g
Fibre	8.4

Contents	mg/100 g
Vitamin B_1	0.62
Vitamin B_6	0.7
Vitamin E	34
Niacin	6
Magnesium	0.03

Contents	mg/100 g
Calcium	200
Potassium	500
Phosphorus	500
Sodium	500
Iron	17

Sources: Malhotra, 2004; Srinivasan, 2018

Nigella sativa L. seeds are best sown in early spring in the temperate zones and during the winter in tropical environments. The ambient temperature range of 5 to 8 °C and 60% soil moisture are the best conditions for planting.

Scope and limitations of the study

This report presents a preliminary market analysis of kalonji, which includes its current production and international trade. The report is based on the data and literature available through secondary sources including the databases of the FAO, WTO, UN ComTrade and the World Bank.

This study has limitations due to lack of kalonji specific data as kalonji is not assigned as a separate horticultural commodity. No long term data on production and trade of kalonji have been found in the literature apart from some discrete data. This report presents baseline information collected from secondary sources for general understanding of the current production and indicative future demand for kalonji in the international markets.

Analysis of the production practices, methods, and agronomic factors affecting yield and seed quality will be provided in subsequent reports of this CRCNA Project (A.2.1819045) based on the field varietal trials being undertaken as part of the CRCNA supported project.

Kalonji production

Global production data for Kalonji seed is not available in published online literature. However, we do know that kalonji is widely grown particulary in India, Pakistan, Syria, Turkey, Saudi Arabia, Egypt and Bangladesh (Ahmad et al., 2013, Malhotra, 2004).

India is believed to be the world's largest kalonji producer (Malhotra, 2004), however, no India-specific production data for kalonji is available. The Turkish government website has kalonji (Black seed) production data figures for the seven years between 2012 and 2018, which indicates that Turkey produced about 3,300 tonnes in 2018 (TurkStat, 2019) (Figure 1). The average Turkish kalonji yield was 933kg/ha.

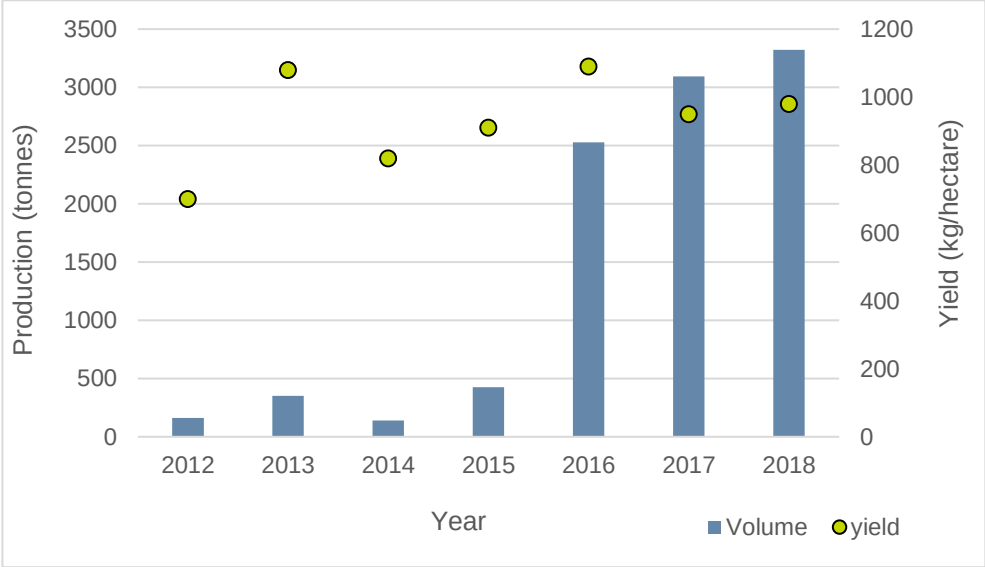

Figure 1: Annual production and yield of kalonji in Turkey (Data Source: TurkStat, 2019).

Literature indicates high variation in the yield data for kalonji in Turkey. Ozel et al. (2009) reported that the yield of kalonji in Turkey ranged from 1406 to 2482kg/ha. This is distinctly higher than the report of Tuncturk et al. (2005) which evaluated the yield based on different seed rate in Turkey, and concluded that a maximum yield of 701.2kg/ha was achieved with a seed sowing rate of 15kg/ha (Table 2). This data suggest significant yield improvement of kalonji in Turkey in recent years compared to early 2000 (700 kg vs 1000 kg between 2005 and 2018).

Table 2: Yield on kalonji and essential oil content with different seed rates in Turkey.

Seed rates (kg/hectare)	Seed yield (kg/hectare)	Essential oil content (%)
5	364.3	0.51
10	494.1	0.48
15	701.2	0.50
20	588.0	0.55

Source: Tuncturk et al., 2005

Kalonji seeds contain oil rich in unsaturated fatty acids, mainly linoleic acid (50-60%), oleic acid (20%), eicodadienoic acid (3%) and dihomolinoleic acid (10%). Saturated fatty acids (palmitic, stearic

acid) amount to about 30% or less. α-sitosterol is a major sterol, which accounts for 44% and 54% of the total sterols in Tunisian and Iranian kalonji varieties respectively, followed by stigmasterol (6.57-20.92% of total sterols) (Ahmad et al., 2013)

Kalonji exporting and importing countries

Global trade data (both export and import) are not available for kalonji and only very limited country and time specific data is available.

According to Global Market Insights, Inc, the USA Nigella oil market is predicted to hit US$25million by 2025. It is also expected that the demand for kalonji oil in the USA for nutraceutical application alone will exceed 130 tonnes by 2025 (Globe Newswire, 2019). Another report predicted that the demand for kalonji oil in the United Kingdom (UK) will be over 35t by 2025 (Market watch, 2019). The same report also predicted the demand for kalonji in Saudi Arabia and Italy as well.

The international trading price is variable with only a few studies mentioning an indicative price. The trading price of Indian kalonji ranges from US$2,258/tonne to US$2,750/tonne (Engels & Brinckmann, 2017). The Egyptian kalonji attracts a slightly higher trading value with US$ 2,900/tonne of conventional kalonji and US$3,000/tonne of organic kalonji (Engels & Brinckmann, 2017). Organic kalonji generally attracts a marginally higher market price compared to a conventionally produced crop.

Kalonji market in Australia

Australia is a net importer of kalonji seeds. The current demand for kalonji seeds in Australia is not available in open online sources. A secondary data source indicated that in 2016 from 16 February to 15 October, Australia imported about 70.3 tonnes of kalonji from India, with the unit price ranging from AUD $4,000 to $10,000/t (Zauba, 2018).

For farmers and processors seeking to establish a domestic kalonji (Black seed) industry, it is noted that there are already several trading companies in Australia importing, distributing and wholesaling kalonji and kalonji oil.

Value-added kalonji products

The seeds of the kalonji plant are known for their diverse culinary uses and medicinal properties.

Kalonji is mostly used for cooking and seasoning, with kalonji oil and kalonji powder the most common value-added products for the food market. Kalonji is widely used in the Indian subcontinent as a spice in mildly braised meat dishes, vegetables and chutneys (Malhotra, 2004). Kalonji products are largely consumed in the form of oil or capsules and are also be applied topically in order to attain skin benefits. Black seed oil is also incorporated in shampoos, home skin care products, fragrances and massage oils, thereby propelling industry growth.

Recent medical research indicates that powdered kalonji could be beneficial in a wide range of medical and therapeutic uses. Farhangi *et al.* (2018) reports that kalonji seeds are useful for weight loss, alleviation of adverse symptoms of eczema, reduction of liver and kidney disease and for controlling diabetics (Gal, 2018). Srinivasan (2018) has summarised different usages of kalonji and graphically presented the medicinal properties of kalonji (Figure 2).

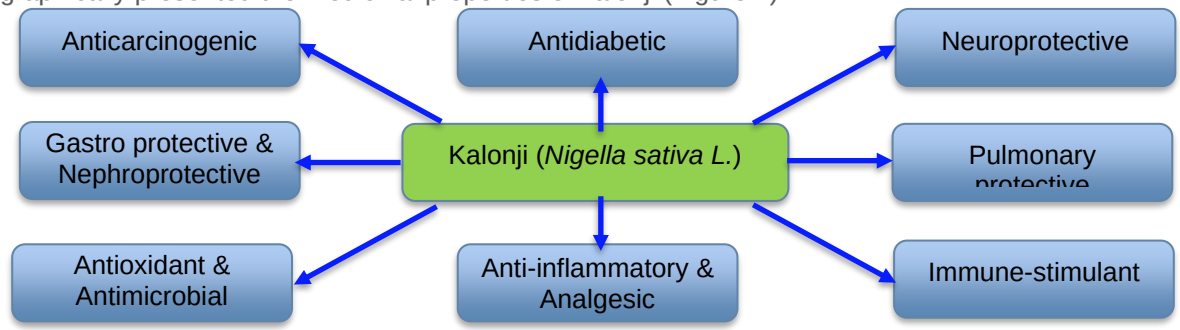

Figure 2: Medicinal usage of kalonji (adapted from Srinivasan, 2018)

Conclusion

From the available data it is evident that kalonji production in Turkey is increasing, in line with increasing consumer demand in both the US and UK. Growing kalonji use in baking, cooking and formulating beverages may further drive product demand in the future.

Australia has the potential to enter into the commercial production of kalonji by first targeting the domestic market. However, the lack of robust and defensible data is one of the challenges for the industry to predict future demand.

The current CRCNA 'Spicing up the North' project is designed to provide a baseline of information on kalonji varietal performance and environmental suitability in an Australian farming system. The project will also assess the gross margins of kalonji production in Australian conditions during the verification and commercialisation phases. Further research will be required to address a number of other questions including:

- A detailed value chain analysis to investigate factors including logistics (storage, segregation, transport etc), product processing infrastructure, consumer preference and the viability of value-added products.
- Detailed analysis of quality attributes of commercially grown kalonji varieties to understand how Australian grown product can compete, and
- Business, agronomic and environmental risks, including weeds, pest and disease issues, biosecurity and continuity of supply.

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