

RESEARCH ARTICLE



Changes in seed yield and oil quality of flax (*Linum usitatissimum* L.) for industrial use in response to nitrogen and potassium fertilization

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ABSTRACT

The effect of nitrogen (N) and potassium (K) fertilization on yield and oil content in flaxseed, chemical properties and the composition of the fatty acids in the seed oil of flax, is important considering the growing global demand of the oil. The experiment was conducted at Barrackpore, West Bengal, India, with a combination of four N (0, 40, 80 and 120 kg ha⁻¹) and three K (0, 30 and 60 kg ha⁻¹) doses replicated thrice in a randomised complete block design. The quality of flax seed oil was significantly influenced by N and K fertilization. Higher N doses decreased the seed oil content but increased the oil yield. Increased N doses reduced the iodine value (IV), peroxide value (PV), and unsaturated fatty acid (UFA) content, particularly the α -linolenic acid (ALA) content in flax seed oil while the acid value (AV), free fatty acid (FFA), saturated fatty acid (SFA) and oleic acid contents were increased with N application. Potassium fertilization decreased the values of FFA, PV, ALA in flax seed oil and enhanced the oleic acid and poly-unsaturated fatty acid (PUFA) content. The UFA/SFA and oleic acid/ALA ratio decreased at higher N and K doses.

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Introduction

Globally, cultivated flax are of two types, varieties grown for oil are commonly known as 'linseed', while those exclusively used for fibre is called 'fibre flax'. At present, the 'oil type' flax is cultivated in an area of 3.54 million ha in the world, producing 3.367 million tons of seed with an average global productivity of 0.951 ton ha⁻¹ and the leading flax seed producing countries are Kazakhstan (1.066 million tons), followed by Belgium, Russian Federation, Canada, and China. In 2019, India produced 0.127 million tons of flaxseed from an area of 0.2 million ha and the average productivity was 0.635 ton ha⁻¹. The top 'flax oil' producing countries in 2019 were China (0.232 million tons) followed by Belgium, U.S.A., Germany and India. India ranked fifth in flax oil production (0.039 million tons) in the world. The global flaxseed (linseed) oil market as of 2022 is estimated to be worth US\$ 7.6 billion and is expected to reach US\$ 13.5 billion by 2032, at a CAGR of 5.9% from 2022 to 2032. It is expected that the flaxseed oil market will acquire about 3% of the global oilseed market by

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