Health Overuse of fungicides in Nyandarua is due to a rise in diseases related to extreme cold weather, agronomist says

Why your potato meal could be containing toxic pesticides

Study conducted by Egerton University reveals widespread use of agrochemicals by potato farmers

BY MERCY CHELANGAT AND WAIKWA MAINA

For 15 years now, Zipporah Atieno's life has revolved around sizzling potatoes, hitting hot oil.

Before dawn breaks over Mukuru Kwa Njenga's corrugated rooftops, her practised hands are already at work—setting up her modest grocery stall, coaxing flames to life beneath her well-worn jiko, and preparing the day's offerings (chips) which are priced from Sh20 to Sh50.

They are affordable comfort, quick sustenance for labourers heading to construction sites, and children on their way to school. On special days, her *githeri* studded with whole boiled potatoes draws long queues of casual workers seeking nourishment to power energy-demanding jobs.

However, in a well-to-do family, the humble potato transforms. Here, it might appear roasted with rosemary and olive oil, baked under layers of cheese or plated alongside expensive cuts of meat. The preparation

in food exceed allowable limits. In 2018, 1,139 samples of fresh produce intended for export and local markets were tested by the Kenya Plant Health Inspectorate Service (KEPHIS). Pesticides were detected on 46 per cent of the samples, while 11 per cent had residues exceeding EU maximum residue levels.

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due levels even if the total amount of pesticide applied remains constant," says the study.

Another concerning finding was the widespread disregard for recommended application rates. A mere 11 out of every 100 farmers adhered to the manufacturer's instructions, while the majority relied on advice from agrochemical retailers (75 per cent) or fellow farmers (13.32 per cent).

"This reliance on non-expert guidance could be attributed to a lack of technical background, scientific training on the use of pesticides, and access to agricultural experts through crop adviser programmes which increases the risk of improper pesticide use, and leading to either over-application or under-application. Over-application can result in higher residue levels, posing health risks to consumers, while under-application may not effectively control pests, potentially leading to crop damage and reduced yields."

Almost all farmers (93.27 per cent) also applied pesticides at least once every seven days, creating risks for both human health and the environment, while also accelerating the development of pesticide resistance in pests.

Some farmers also applied pesticides preventatively, regardless of actual pest or disease presence due past experiences of predictable crop damage due to fungal diseases.

Farmers in the study also indicated applying pesticides at various critical growth stages: before planting (61.46 per cent), during emergence and tuber initiation (54.78 per cent), at weeding (45.21%), and during flowering (51.29 per cent), raising concern that they would not allow sufficient time for certain pesticides to break down to safe levels before harvest.

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However, in a well-to-do family, the humble potato transforms. Here, it might appear roasted with rosemary and olive oil, baked under layers of cheese or plated alongside expensive cuts of meat. The preparation and presentation may differ dramatically, but one concern silently bridges these disparate worlds. Whether served on chipped enamel plates in Mukuru or fine China in Karen, the question lingers with each bite: what invisible residues might be hiding within these staple tubers?

The worry about pesticide contamination creates an unexpected equality, a shared vulnerability that transcends economic divides, linking the street vendor's customers with those dining in exclusive establishments.

According to a new study conducted by Egerton University, potatoes undergo various cooking processes before consumption, the study evaluated the impact of frying, baking, boiling, and steaming on pesticide residue levels.

The good news is that these common heat processing methods generally proved effective in reducing pesticide residues. Frying and boiling emerged as particularly efficient in diminishing the levels of most pesticides. However, baking, roasting, and frying failed to reduce the concerning levels of some pesticides below the established safety thresholds.

Research has shown that three out of every 10 pesticides registered by the Pest Control Products Board (PCPB) in Kenya are withdrawn from the European market or are heavily restricted due to potential chronic health effects.

Studies conducted in Kenya also show that pesticide residue levels in food exceed allowable limits. In 2018, 1,139 samples of fresh produce intended for export and local markets were tested by the Kenya Plant Health Inspectorate Service (KEPHIS). Pesticides were detected on 46 per cent of the samples, while 11 per cent had residues exceeding EU maximum residue levels.

And now, a study conducted by Egerton University has revealed a widespread use of agrochemicals by potato farmers, raising critical concerns about pesticide residues lurking within the tubers and potentially making their way onto our plates.

"There is widespread noncompliance among potato farmers in Nyandarua County, Kenya, regarding manufacturer instructions for pesticide application rates, frequencies, and preharvest intervals. This has led to the accumulation of excessive pesticide residues in potato products from this region, threatening the safety of potato product' consumers," the study cautions.

According to the study, the annual production of potatoes in Kenya reaches approximately 2.8 million tons. The potato industry contributes close to Sh50 billion to Kenya's economy and supports the livelihoods of around 2.5 million people. Kenya's national domestic demand for potatoes stands at about 3.1 million tons against 2.8 million tons that are available for utilisation.

"The rising demand for potatoes in Kenya has largely evolved in response to changes in urban population growth, taste and preferences, and potato consumption habits. Consequently, it has pushed the per capita consumption of potatoes from 35 kg per person in 2019 to 63kg in 2021," says the study.

"The main potato growing regions in Kenya are; Nyandarua, Bomet, Meru, Nakuru, Uasin Gishu, Narok, Nyeri, Kiambu, Trans Nzoia, West Pokot, and Elgeyo-Marakwet with Nyandarua being the leading producer. There are more than fifty improved and local potato varieties in Kenya with the 'Shangi' variety being the main variety grown and consumed because of its ready market, good cooking qualities, readily available seeds, high yields, and early maturity as compared to others."

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50

Amount in billions the potato industry contributes to Kenya's economy and supports the livelihoods of around 2.5 million people.

The study notes that climate change is worsening pest and disease pressures in potato farming, posing a significant threat capable of causing complete crop failure if left unmanaged. Consequently, farmers are increasingly dependent on synthetic pesticides, including various classes, to protect their yields.

The study, which surveyed 275 randomly selected farmers and analysed 16 raw potato samples, paints a picture of intensive pesticide application. An overwhelming 98 out of every 100 farmers reported using synthetic pesticides, with fungicides being the most prevalent (96.4 per cent), followed by insecticides (68.2 per cent) and herbicides (28.7 per cent).

"Among the pesticides used, fungicides are the most commonly used (96.4 per cent) due to the increased cases of fungal diseases such as late and early blight. Gianessi & Williams (2011) reported that about 93–100 per cent of potato farmers in Kenya exclusively rely on synthetic pesticides to control late blight. This could be due to the recycling of seeds from the previous harvest, intensive monocropping, all-year-round potato cultivation, excessive reliance on synthetic chemicals, and poor plant debris management in the region," sys the study.

The study adds: "Mancozeb and Metalaxyl are extensively used as compared to other fungicides. This could be attributed to the availability and accessibility of the fungicides containing these active ingredients in the local markets."

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Why are we doing the story?

Firstly, it brings to light the alarming reality of widespread pesticide misuse in Kenya's potato farming sector, a cornerstone of the nation's food security and economy. The Egerton University study's findings, revealing that a vast majority of farmers disregard safety guidelines and that pesticide residues often exceed safe levels, directly impacts the health of millions of Kenyans who consume potatoes daily. By highlighting the potential chronic health effects and the presence of pesticides banned or restricted elsewhere, the story underscores a significant public health concern that demands urgent attention.

Farmers also reported mixing pesticides, in an attempt to get a new formulation that has high toxicity, and preventive measures if there are pests or other diseases.

However, the researchers warn that the practice can be dangerous and "may lead to unintended interactions, increased toxicity, and/or it can reduce the efficacy of the pesticides.

"Potato tubers from farmers who adhered to manufacturer instructions for pesticide application, including herbicides, fungicides, and insecticides, had significantly lower residue levels in potatoes. Additionally, mixing pesticides led to high residue levels, potentially due to improper mixing ratios or synergistic effects, where the combined toxicity exceeds the sum of the individual components. This can lead to higher resi-

velopment of pesticide resistance in pests.

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Farmers in the study also indicated applying pesticides at various critical growth stages: before planting (61.46 per cent), during emergence and tuber initiation (54.78 per cent), at weeding (45.21%), and during flowering (51.29 per cent), raising concern that they would not allow sufficient time for certain pesticides to break down to safe levels before harvest.

This non-compliance was driven by peak market demand, financial constraints, the desire for higher profits, or a lack of understanding regarding the importance of adhering to post-harvest interval guidelines.

Nation caught up with some farmers from the region, who complained that the study appears to offer a blanket condemnation of farmers from Nyandarua. They also questioned why other potato-growing counties were not included in the study.

"The blanket condemnation is unrealistic. I am a member of a potato cooperative society, we do random farm visits and I can attest that the allegation is false, we read sinister motive in the report," says Mr Kanyoni, also the chairperson, Ol Kalou Dairy Farmers Cooperative Society.

Ms Emma Nyaguthii, a farmer, said genuine pesticides are expensive.

Reacting to the study, Faith Kamore, an Agronomist said fungal diseases associated with extreme cold weather have become more common in Nyandarua, forcing farmers to overuse fungicides to protect their crops. Unpredictable weather has also forced farmers to harvest potatoes prematurely, leaving insufficient time for applied chemicals to dissipate from the tubers or for the tuber skin to harden, which would significantly reduce chemical residues.

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