



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Non-Permitted Food Colours in Red Palm Oil - April 1, 2019 to March 31, 2020

Food chemistry - Targeted surveys - Final report



Summary

Targeted surveys provide information on potential food hazards and enhance the Canadian Food Inspection Agency's (CFIA's) routine monitoring programs. These surveys provide evidence regarding the safety of the food supply, identify potential emerging hazards, and contribute new information and data to food categories where it may be limited or non-existent. They are often used by the agency to focus surveillance on potential areas of higher risk. Surveys can also help to identify trends and provide information about how industry complies with Canadian regulations.

The main objective of this targeted survey was to generate information on the presence and levels of non-permitted colours in red palm oils available on the Canadian retail market.

Colours are added to foods to compensate for the natural colour loss due to processing, to achieve a uniform product colour and to make food appear more appealing¹. This targeted survey is focused on non-permitted colours, Sudan III and IV, in red palm oils because they are potentially toxic and carcinogenic². Sudan III and IV are red dyes used for industrial products such as textiles, polish and paints and are banned for use in food².

Palm oil is a nutritious oil that is reddish-brown in colour, contains beta-carotene and is produced from the fruit pulp of the oil palm tree³. It is mainly produced in Asian and West African countries³. Because of their low cost and bright colour, Sudan III and IV could be used illegally by some producers to enhance the red colour of palm oil to appear to have a better quality product².

As a result of Government of Canada food safety as well as food misrepresentation priorities, CFIA has undertaken a survey to monitor red palm oils for the presence of non-permitted colours. A total of 72 imported red palm oil samples were collected from retail and tested for non-permitted food colours. 1 sample of red palm oil contained 47.5 ppm of Sudan IV. The remaining 71 samples (98.6%) were compliant and did not contain any detectable amount of non-permitted colours. The Office of Food Safety and Recall (OFSR) followed up on the non-compliant sample which resulted in a class 2 recall and destruction of product on the market⁴.

What are targeted surveys

Targeted surveys are used by the CFIA to focus its surveillance activities on areas of highest health risk. The information gained from these surveys provides support for the allocation and prioritization of the agency's activities to areas of greater concern. Originally started as a project under the Food Safety Action Plan (FSAP), targeted surveys have been embedded in our regular surveillance activities since 2013. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying and characterizing new and emerging hazards, informing trend analysis, prompting and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. We work with federal, provincial, territorial and municipal governments and provide regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

Why did we conduct this survey

The main objective of this targeted survey was to generate information on the presence and levels of non-permitted colours in red palm oils available on the Canadian retail market.

In Canada, food colours are considered food additives and are regulated under marketing authorizations issued by the Minister of Health. Colours are added to foods to compensate for the natural colour loss due to processing, to achieve a uniform product colour and to make food appear more appealing¹. This targeted survey is focused on non-permitted colours, such as Sudan III and IV, in red palm oils because they are potentially toxic and carcinogenic² and because they have been used in the past as an adulterant that can give the appearance of higher quality oil.. Sudan III and IV are red dyes used for industrial products such as textiles, polish and paints and are banned for use in food².

Palm oil is a nutritious oil that is reddish-brown in colour, contains beta-carotene and is produced from the fruit pulp of the oil palm tree³. It is mainly produced in Asian and West African countries³. Because of their low cost and bright colour, Sudan III and IV could be used illegally by some producers to enhance the red colour of palm oil to appear to have a better quality product².

This is the first targeted survey to focus solely on non-permitted colours in red palm oil.

What did we sample

A variety of imported red palm oils were sampled between April 1, 2019 and March 31, 2020. Of the 72 samples, 46 were organic. Samples of products were collected from local/regional retail locations located in 6 major cities across Canada. These cities encompassed 4 Canadian

geographical areas: Atlantic (Halifax), Quebec (Montreal), Ontario (Toronto, Ottawa) and the West (Vancouver, and Calgary). The number of samples collected from these cities was in proportion to the relative population of the respective areas. The shelf life, storage conditions, and the cost of the food on the open market were not considered in this survey.

How were samples analyzed and assessed

Samples were analyzed by an ISO/IEC 17025 accredited CFIA laboratory. Samples were analyzed for fat-soluble colours. See [appendix A](#) for a list of the colours analyzed. The results presented represent finished food products as sold and not as they would be consumed, whether the product sampled is considered an ingredient or requires preparation prior to consumption.

What were the survey results

Of the 72 samples tested, 1 sample was positive for Sudan IV with a concentration of 47.5 ppm. 98.6% of samples did not contain detectable amounts of non-permitted colours.

What do the survey results mean

This is the first targeted survey focusing solely on testing for non-permitted colours in red palm oil by the CFIA. Previous targeted surveys that tested for non-permitted and permitted food colours (water and fat-soluble colours) had a portion of red palm oil samples included in the survey. See Table 1 below for a comparison of survey results for non-permitted colours in red palm oils.

In a 2017 to 2018 CFIA survey, there was 1 non-compliant sample out of 27 with a concentration of 44.9 ppm of Sudan IV. Samples taken in CFIA surveys initiated in 2013 and 2018 were 100% compliant for non-permitted colours in red palm oil samples^{5,6}.

Table 1. Food colour results from various survey years

Survey year	Number of samples	Number of non-compliant samples (%)	Compliance rate (%)	Concentration of non-compliant sample for Sudan IV (ppm)
CFIA 2013 to 2014	25	0 (0%)	100%	
CFIA 2017 to 2018	27	1 (3.7%)	96.3%	44.9

CFIA 2018 to 2019	23	0 (0%)	100%	
Current CFIA survey	72	1 (1.4%)	98.6%	47.5

The non-compliant sample from this survey triggered testing of follow up samples by the OFSR which resulted in a class 2 recall and destruction of the product⁴. The results of CFIA's surveillance activities are also used to inform the Canadian public and stakeholders by raising consumer awareness and help build public confidence in their food supply by removing non-compliant products.

Appendix A

Non-permitted colours tested

- Citrus Red 2
- Chlorophylline
- Metanil Yellow
- Methyl Yellow
- Orange II
- Para Red
- Rhodamine B
- Solvent Blue 59
- Sudan Black B
- Sudan Blue II
- Sudan I
- Sudan II
- Sudan III
- Sudan IV
- Sudan Orange G
- Sudan Red 7B
- Sudan Red G
- Toluidine Red

References

1. Genualdi, S., MacMahon, S., Robbins, K., Farris, S., Shyong, N., & DeJager, L. (2016). Method development and survey of Sudan I-IV in palm oil and chilli spices in the Washington, DC, area. *Food additives & contaminants: Part A, Chemistry, analysis, control, exposure & risk assessment*, 33(4). pp. 583–591.
2. [Food Colours](#). European Food Safety Authority.
3. Andoh, S.S. , Nyave, K., Asamoah, B., Kanyathare, B., Nuutinen, T., Mingle, C., Peiponen, K.E. & Roussey, M. (2020). Optical screening for presence of banned Sudan III and Sudan IV dyes in edible palm oils. *Food Additives & Contaminants: Part A*, 37(7). pp. 1049-1060.
4. [Red Palm Oil recalled due to Sudan IV](#). (2020). Canada. Government of Canada.
5. [2013-2014 Food Colours in Selected Foods](#). (2019). Canada. Government of Canada.
6. [Food Colours in Essences/Flavourings, Oils, Sweets and Processed Vegetables – April 1, 2018 to March 31, 2019](#). (2021). Canada. Government of Canada.