# Prohibited_Coloring_Agent

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# Prohibited Coloring Agent in Dominating Hazardous Street Food around Elementary School in Semarang-Indonesia

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***Abstract*—Snack foods comprise ready-to-eat foods and beverages that are sold by traders. Street foods in Indonesia are often misused by adding hazardous substances those are prohibited or safe limits. The aim of this study was to understand the street food quality and safety in elementary schools in Semarang. This was an observational study conducted by a research technique of simple random sampling. The target of the study was snack foods sold around 32 elementary schools in the city of Semarang. The hazardous substances present in the food were qualitatively analyzed by an easy method using easy testing kits. There were four schools with no exposure to hazardous substances. In addition, rhodamine B is the most often substances added to snack foods primarily sauce, seasoning powder, and jam. The percentage of street foods containing preservatives (formalin and borax), coloring agents (rhodamine B and metanil yellow), and sweeteners (cyclamate and saccharin) is still high. Therefore, It is necessary to control the sales of street foods, especially those containing harmful food additives, to prevent food adulteration.**

***Index Terms*—street food, food adulteration, preservatives, coloring agents, sweetener**

## I. Introduction

Street food safety still needs attention because of the utilization of food additives that exceed the permissible concentration, thereby compromising the quality and microbiological safety requirements. Every year, the National Agency of Drug and Food Control reports about the use of formalin, borax, rhodamine B, and metanil yellow as food additives and the use of food additives that exceed the permissible concentration, such as benzoate and artificial sweeteners, in street foods. Street foods comprise ready-to-eat foods and beverages prepared and/or sold by vendors on the street surrounding the schools and are regularly consumed by most of the schoolchildren [1].

To provide access to safe food and nutritious street food, the government states that educational institutions must have facilities, including a canteen, in their schools. A research conducted by the Center for Physical Quality Development Ministry of Education on healthy schools in 2007, including 640 primary schools in 20 provinces, reported that 40% of schools did not have a canteen, whereas 60% of schools had a canteen and 84.3% of the canteens did not meet the health requirements [2].

The culture of eating snacks has become a part of life in almost all age groups and social classes, including school-age children and adolescents. A study conducted by Syafitri et al showed that frequency of student main food snack (3-5 times/week) equal to 44%. As many as 66% students have a snack frequency > 11 times/week, and 30% of students have a snack frequency of drinks 6-8 times/week [3]. As a routine, schoolchildren play and buy snack foods that are sold around the school. Consequently, the schoolchildren cannot be controlled by menus and nutritional food regarding any snacks purchased at the school, although the schools have rules for schoolchildren stating not to buy snack foods outside the school. However, in general, schools are very lenient toward this problem because of social and humanitarian factors. Moreover, the habit of eating street foods outside of school time is not monitored well, as a result of which the schoolchildren can buy food to street food vendors, which might containing harmful substances [4].

According to the results of supervision by the National Agency of Drug and Food Control in recent years, there are four types of hazardous substances that are often misused in foods, which include formalin, borax,

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rhodamine B, and metanil yellow [2]. Results of the survey conducted by the National Agency of Drug and Food Control throughout Indonesia in 2009 showed that 45% of street foods sold around schools were not edible as they contain harmful chemicals such as formalin, borax, rhodamine, cyclamate, and benzoate exceeding the safe limits [5]. Another survey conducted by the National Agency of Drug and Food Control during January–August 2014 reported that almost one-third of street foods eaten by 23,500 schoolchildren in primary schools and madrasah in Indonesia were contaminated with harmful microbes and contained hazardous substances and food additives. Earlier in 2011, the National Agency of Drug and Food Control also showed that 35.5% of street foods sold around the schools were inedible in terms of food safety [2]. The present study was conducted with the aim of observing the condition of street food vendors surrounding the schools in Semarang city.

## II. Methods

This was an observational study conducted in November and December in 2016 in Semarang city. The independent variables were formalin, borax, rhodamine B, metanil yellow, saccharin, and cyclamate. Street food samples were collected from 32 schools selected by simple random sampling. These samples included the foods sold around the schools.

The hazardous substances (formalin, borax, metanil yellow, saccharin, and cyclamate) present in the food samples were qualitatively tested at the Chemical Laboratory of Nutrition Sciences, Diponegoro University, using easy testing kits. Results of the analysis are presented in the descriptive form.

## III. Results and Discussion

### A. Results

Formalin, borax, rhodamine B, saccharin, and cyclamate were qualitatively analyzed using easy testing kits. Each food sample was tested three times repetitively. The samples were identified as positively containing hazardous substances if two of the repetitions showed positive results.

Table I shows the amount of hazardous substances detected in the tested street food samples. Among the hazardous substances that were added to foods, the mostly used substance was rhodamine B (55.13%).

TABLE I. Characteristics of Primary School Snack Foods

| Hazardous substances | n | Positive n (%) | Negative n (%) |
|---|---|---|---|
| Formalin | 93 | 10 (10.75) | 83 (89.25) |
| Borax | 69 | 11 (15.94) | 58 (84.06) |
| Rhodamine B | 78 | 43 (55.13) | 35 (44.87) |
| Metanil yellow | 69 | 7 (10.14) | 62 (89.86) |
| Saccharin | 25 | 2 (8.00) | 23 (92.00) |
| Cyclamate | 25 | 9 (36.00) | 16 (64.00) |

The types of food containing hazardous substances were not limited to only certain types of food as in Table II. Formalin and borax were used in foods prepared as a mix of meat as the ingredient, such as chicken and beef. Rhodamine B was used in a mixture of sauces and seasonings to enhance the red color of the food. Metanil yellow was used in a mixture of various foods. Among the types of foods containing meat, six samples tested positive for formalin (Table III).

TABLE II. Foods Containing Hazardous Substances

| Hazardous substances | Type of food |
|---|---|
| Formalin | Meatballs, *tempura*, *sempolan*, *gorengan*, *ayam* |
| Borax | Meatballs, *cilok*, *tahu bakso*, *batagor*, dumpling, *tempura* |
| Rhodamine Bv | Sauce, seasoning powder, jams, *nugget*, *otak-otak*, *tempura*, corned, instant drinks |
| Metanil yellow | *Terang bulan*, sauce, corned, instant drinks |
| Saccharin | Jams |
| Cyclamate | Instant drinks, *kinca*, jams, cake, *meizes*, jelly, ice cream |

TABLE III. Formalin Positive Foods

| No | Type of food | n | Positive n % | Negative n % |
|---|---|---|---|---|
| 1. | Meatballs | 12 | 2 (16.67%) | 10 (83.33%) |
| 2. | *Tempura* | 2 | 2 (100%) | - |
| 3. | Sausage | 9 | 1 (11.11%) | 8 (88.89%) |
| 4. | *Sempolan* | 1 | 1 (100%) | - |
| 5. | *Gorengan* | 3 | 3 (100%) | - |
| 6. | *Ayam* | 1 | 1 (100%) | - |

Table IV shows the types of snack foods tested positive for borax. The results showed that meatballs, cilok, and batagor were often prepared using borax as additive substance. Of the 15 meatball samples tested for borax content, 4 samples (26.67%) were found to be positive for borax.

TABLE IV. Borax Positive Foods

| Type of food | N | Positive n % | Negative n % |
|---|---|---|---|
| Meatballs | 15 | 4 (26.67%) | 11 (73.33%) |
| *Cilok* | 7 | 3 (42.86%) | 4 (57.14%) |
| *Tahu bakso* | 2 | 1 (50.00%) | 1 (50.00%) |
| *Batagor* | 3 | 1 (33.33%) | 2 (66.67%) |
| Dumpling | 6 | 1 (16.67%) | 5 (83.33%) |
| *Tempura* | 6 | 1 (16.67%) | 5 (83.33%) |

The type of street food mostly containing rhodamine B was the seasoning powder. Of the 14 samples tested, 10 samples (71.43%) were found to contain rhodamine B.

Other food types that often contained rhodamine B were sauces (53.33%) and jams (66.67%) (Table V).

TABLE V. RHODAMINE B POSITIVE FOODS

| Type of food | n | Positive n % | Negative n % |
|---|---|---|---|
| Sauce | 30 | 16 (53.33%) | 14 (46.67%) |
| Seasoning powder | 14 | 10 (71.43%) | 4 (28.57%) |
| Jam | 6 | 4 (66.67%) | 2 (33.33%) |
| *Nugget* | 3 | 3 (100%) | - |
| *Otak-otak* | 1 | 1 (100%) | - |
| *Tempura* | 2 | 1 (50%) | 1 (50%) |
| Instant drinks | 5 | 4 (80%) | 1 (20%) |
| Ice cream "X" strawberry | 1 | 1 (100%) | - |
| Corned | 1 | 1 (100%) | - |
| Cotton candy | 2 | 1 (50%) | 1 (50%) |

Regarding the additive substance metanil yellow, it was observed that food types such as terang bulan, corned, and instant drinks contained metanil yellow. In addition, of the 15 sauce samples tested, 2 samples (13.33%) were positive for metanil yellow (Table VI).

TABLE VI. METANIL YELLOW POSITIVE FOODS

| Type of food | n | Positive n % | Negative n % |
|---|---|---|---|
| *Terang bulan* | 2 | 2 (100) | - |
| Sauce | 15 | 2 (13.33%) | 13 (86.67%) |
| Corned | 1 | 1 (100%) | - |
| Instant drinks | 1 | 1 (100%) | - |

Analysis of five jam samples revealed that two samples (40%) were positive for saccharin (Table VII). Table VIII shows the presence of cyclamate in each (100%) of the six food types of the total eight food types tested. This result was observed because only one sample for each of the six food types was tested for cyclamate.

TABLE VII. SACCHARIN POSITIVE FOODS

| No | Type of food | n | Positive n % | Negative n % |
|---|---|---|---|---|
| 1. | Jam | 5 | 2 (40%) | 3 (60%) |

TABLE VIII. CYCLAMATE POSITIVE FOOD

| No | Type of food | n | Positive n % | Negative n % |
|---|---|---|---|---|
| 1. | Tea | 2 | 1 (50%) | 1 |
| 2. | *Kinca* | 1 | 1 (100%) | - |
| 3. | Instant drinks | 3 | 2 (66.67%) | 1 (33.33%) |
| 4. | *Kuah pempek* | 1 | 1 (100%) | - |
| 5. | Jam | 4 | 1 (25%) | 3 |
| 6. | Ice cream "X" strawberry | 1 | 1 (100%) | - |
| 7. | *Bolu kukus* | 1 | 1 (100%) | - |
| 8. | *Meizes* | 1 | 1 (100%) | - |

Based on the distribution data of schools in the city, schools that were highly exposed to street foods containing hazardous substances were SD 8, SD 5, SD 6, SD 9, SD 12, and SD 18 (Table IX).

TABLE IX. DISTRIBUTION OF HAZARDOUS-SUBSTANCE-CONTAINING STREET FOODS AROUND THE SCHOOLS

| School name | Formalin | Borax | Rhodamine B | Metanil yellow | Saccharin | Cyclamate | Total |
|---|---|---|---|---|---|---|---|
| ES 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ES 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| ES 3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ES 4 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ES 5 | 1 | 0 | 2 | 1 | 1 | 0 | 5 |
| ES 6 | 1 | 1 | 1 | 2 | 0 | 0 | 5 |
| ES 7 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ES 8 | 4 | 2 | 2 | 0 | 0 | 1 | 9 |
| ES 9 | 1 | 0 | 3 | 0 | 0 | 1 | 5 |
| ES 10 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ES 11 | 1 | 1 | 1 | 0 | 0 | 0 | 3 |
| ES 12 | 1 | 0 | 2 | 0 | 0 | 1 | 4 |
| ES 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ES 14 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| ES 15 | 0 | 0 | 2 | 0 | 0 | 1 | 3 |
| ES 16 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| ES 17 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| ES 18 | 0 | 0 | 5 | 0 | 0 | 0 | 5 |
| ES 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ES 20 | 0 | 2 | 2 | 0 | 0 | 0 | 4 |
| ES 21 | 0 | 2 | 2 | 0 | 0 | 0 | 4 |
| ES 22 | 0 | 0 | 1 | 2 | 0 | 1 | 4 |
| ES 23 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| ES 24 | 0 | 0 | 2 | 0 | 0 | 1 | 3 |
| ES 25 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ES 26 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ES 27 | 0 | 0 | 3 | 0 | 0 | 1 | 4 |
| ES 28 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| ES 29 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ES 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ES 31 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| ES 32 | 0 | 1 | 1 | 0 | 1 | 1 | 4 |

*ES = Elementary School

## B. Discussion

### 1) School description

Of the 32 schools targeted, four schools showed 0% exposure to hazardous substances in foods, implying that the street foods sold around the schools contained no hazardous substances such as formalin, borax, rhodamine B, metanil yellow, saccharin, and cyclamate. Three schools that were located near the city had a clean school

environment, comprising children from the upper middle class. Another school was located near the market and had children from the middle-income class.

*2) Characteristics of street foods and hazardous substances*

*a) Preservatives*

Food safety issues, particularly those of street foods around the schools, have become a focus of the government of Indonesia. The government had issued regulations for the ban of the use of harmful or hazardous substances, such as the ban on the use of formalin and borax listed in the Regulatory of Health Minister No. 033 of 2012 as food additives. In the present study, 10 of the 93 samples tested for formalin were found to contain formalin. The types of food containing formalin were sausages, meatballs, tempura, gorengan, and sempolan. Gorengan was a new finding in this study because this food type is generally prepared without using preservatives, which indicates that the use of formalin in food become more varies. A study conducted by Paratmanitya et al showed that of the 98 samples of street foods tested, 25 samples (25.5%) tested positive for formaldehyde, which included meatballs, sausages, dumplings, tempura, and noodles [6].

Formalin acts as an antibacterial agent that can slow down the activity of bacteria in foods containing excessive protein; formalin reacts with the protein in food and makes the food last longer. High formalin content in the body can cause abdomen irritation, allergic and carcinogenic effects, changes in the function of cells/tissues, vomiting, and deaths due to circulatory failure [7].

In this study, 11 samples of the 69 food samples tested were found to be positive for borax. Foods containing borax included meatballs, tahu bakso, cilok, batagor, dumplings, and tempura. In other cities, vendors also add harmful substances as a mixture of borax in street foods. In Bantul, of the 98 samples of street foods tested, 15 samples (15.3%) were positive for borax. These foods included meatballs, meatball chips, tempura, noodles, tahu bakso, and kerupuk. Borax was reportedly used as a food preservative in some foods containing meat and dairy products. This is because borax is able to inhibit the growth of microorganisms, so that the food can stay fresh and last longer. Moreover, the addition of borax is believed to control the gelatinization of starch, as well as improve the color, texture, and taste of the food [8].

*b) Coloring agents*

In the present study, of the 78 samples tested, 43 samples were positive for rhodamine B. The types of foods containing rhodamine B were seasoning powder, sausages, jams, instant drinks, nuggets, otak-otak, tempura, and ice cream "X" strawberry. In other areas also, there is an increase in the use of rhodamine B in street foods. Paratmanitya et al reported that street foods in Bantul such as jelly, es cendol, syrup, sauces, and ice purple contained rhodamine B [6].

The increasing use of rhodamine B in food products could be due to its inexpensiveness compared with the cost of permitted food dyes. Another reason could be the lack of knowledge among domestic industrial producers regarding which coloring agent is allowed for use in foods [9]. Prohibiting the use of rhodamine B was regulated by Joit Regulation of Ministry of Internal Affairs and Head of National Agency of Drug and Food Control No. 43 of 2013 and No. 2 of 2013 [10]. Rhodamine B could cause carcinogenic effects and increase lipid peroxidation as a sign of oxidative stress.

Of the 69 food samples tested, there were 7 positive samples containing metanil yellow. The types of food tested positive for metanil yellow included terang bulan, corned, sauces, and instant drinks. Prohibiting the use of metanil yellow was regulated by the Regulation of the Ministry of Health No.239/Men.Kes/Per/V/85. Metanil yellow was banned from use in foods because it could cause toxic effects in the body [11]. However, currently, metanil yellow is widely used as a yellow coloring agent in foods because it is relatively inexpensive with bright and flashy colors [12].

Metanil yellow accumulates in the liver and affects free radicals, which could cause oxidative stress resulting in damage to the liver cells. Metanil yellow also has neurotoxic effects and causes lipid peroxidation, which indicates that metanil yellow affects the integrity of the cell membrane resulting in damage to the liver cells [13].

*c) Sweeteners*

Of the 25 samples tested for saccharin, there were 2 positive samples containing saccharin, which included jams. Like other harmful substances, saccharin was also found in street foods in other areas. In a school in Pekalongan, saccharin was found in street foods such as es cendol, chocolate wafers, and powder drink flavors. The use of saccharin in street foods was as much as 0.0005–1.3295 mg per serving. Saccharin is an artificial sweetener that has been widely used in foods and beverages without the extra calories. In addition, the sweetness level of saccharin is 300 times more than that of regular sugar. Saccharin is considered safe for consumption by the FDA (Food and Drug Administration) since it is not biologically absorbed or metabolized [14]. It is excreted through the kidneys without any abnormalities. The amount of saccharin that can be used in foods as recommended by the ADI (Acceptable Dietary Intake) is 0.5 mg/kg [15]. The maximum limit of the use of saccharin in foods is regulated by the government as listed in the National Agency of Drug and Food Control Chief Regulation No. 4 of 2014 about Maximum Limit Use of Sweetners Food Additives. The maximum limit of saccharin is 200 mg/kg in food items such as jams, jellies, and marmalades; 120 mg/kg in different types of drinking water-based flavors, not carbonated, including punches; and 300 mg/kg in other sugars and syrups (e.g., xylose, maple syrup, and confectionery sugar), types of table syrups (e.g., maple syrup), syrups used in bakery products and ice ornament (caramel syrup, flavored syrups), and sugar for cake decoration (e.g., colored sugar crystals for cookies) [16].

Regarding cyclamate, of the 25 food samples tested, 9 samples were positive for cyclamate. Another study reported that cyclamate was found in instant beverages

sold in schools. In addition, cyclamate was found in foods such as cracker snacks, biscuits, chocolate wafers, and powder drink flavors. Cyclamate has a negative effect on health if it is continuously consumed for a long time. Takayama et al showed that cyclamate has carcinogenic effects that can lead to malignant cancer cells [17]. Cyclamate use has been prohibited by the National Agency of Drug and Food Control as an artificial sweetener in foods since 2014. However, traders still often use cyclamate in foods because of its high sweet taste (30–50 times sweeter than cane sugar), which could save the cost for sugar as a natural sweetener [18].

The maximum limit of the use of cyclamate was regulated by National Agency of Drug and Food Control No. 4 of 2014 about Food Additives. The maximum limit of cyclamate is 1000 mg/kg in food items such as jams, jellies, and marmalades; 500 mg/kg in food confectioneries/sweets, including confectionery/hard and soft candy and nougat; and 500 mg/kg in other sugars and syrups (e.g., xylose, maple syrup, and sugar ornamental), types of table syrups (e.g., maple syrup), syrups used for decoration of products in bakery and ice products (syrups, caramel, flavored syrups), and sugars used for cake decoration (e.g., colored sugar crystals for cookies)[16].

*3) Analysis of food producers*

The types of street foods sold around the schools can be grouped into self-produced foods made by home industries and foods derived from medium-scale industries. Foods analyzed in this study that could be homemade were batagor, dumplings, sempolan, terang bulan, meatballs, cilok, and tempura. Seasoning powder, sauces, jams, and instant drinks were produced by a medium scale industry (the processed plant). Most of the jams and sauces did not have indications of codes, labels, brands, types, composition, or other data associated with that product.

The addition of hazardous substances; preservatives such as formalin and borax commonly applied by food traders directly to the food. which was sold while the additional material, such as seasoning powder, sauce, butter were added to the main food sold, produced by medium scale industries, and street vendors only use the product. Food producers usually mixed the hazardous substances such as rhodamine B, metanil yellow, saccharin, and cyclamate into the product as an additional material. The reason for using harmful synthetic dyes in foods was that they were less expensive and produced more attractive colors compared with safe food dyes. Moreover, the addition of sweeteners was also aimed at reducing production costs.

The government has been implementing food safety programs in all industries, including household industries. Unfortunately, these sectors have the highest risk for mal-practicing food quality and safety standards. These producers contribute approximately >20% to the total national food consumption, and, especially in urban areas, they could be considered as important contributors to the food supply chains for adults and children [19].

Food adulteration is an unethical business practice. It may occur at any time or any layer along the entire supply chain of the food, from the producer to the consumer and from "Farm to Fork." Any food or food product may reach from the farmer or its producer by the following methods:

- Directly to the hands of the consumers or
- First to retailers and then to consumers or
- First to wholesalers, then to retailers, and at last to consumers or
- First to local agents or brokers, then to manufacturers, later on to wholesalers, then to retailers, and at last to consumers, etc.

Therefore, food adulteration may occur in any of the layers or steps in the process of reaching the food from the farm or production to the fork of the consumers, as shown above. Any one or several of the farmers/producers, retailers, wholesalers, manufacturers, agents/brokers may cause the adulteration of food in a way of adding an adulterant, removing or reducing and substituting any element thereto, or false representation of any item as food with the intention of malice of extra profit-making [20].

Trading system settings do not guarantee the safety of hazardous substances in the market because the distribution of hazardous substances is indicated at approximately 3%–4% of the production of hazardous substances (formalin) into the consumer market, especially small-scale food industries. Leakage of formalin into the consumer market can be triggered by several factors such as utilization of excess production, the uncertainty in the cost of storage business in the small business sector (SME), and weak supervision, in addition to illegal trafficking of hazardous substances due to businesses having problems in obtaining a business license [21].

## IV. Conclusions

The percentage of street foods containing preservatives (formalin and borax), coloring agents (rhodamine B and metanil yellow), and sweeteners (cyclamate and saccharin) is high. The types of foods containing preservatives identified in this study included meatballs and tempura, while those containing coloring agents included spices, jams, and sauces. Sweetener-containing food types were instant drinks and jams. Hence, it is necessary to control the production and sales of street foods, especially foods that are often found to contain harmful chemicals, to prevent food adulteration. Adulteration of food may occur at any time or any layer along the entire supply chain of the food, from the producer to the consumer.

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**Trisna Suryaningrum** was born in Semarang Regency, Central Java Province, Indonesia, in January 5th 1994. From September 2012 to August 2016, Trisna studied and graduated from Nutrition Science, Diponegoro University in Indonesia. Her research field in major is glycemic index on flakes modification between pumpkin flour and mocaf flour. Her work experience as Laboratory Assisst and Practicum Assisst in Food Chemistry and Food Technology courses.

**Diana Nur Afifah** was born in Semarang, July 31st 1980. From 1998 to 2003 Diana studied and graduated from Food Technology, Bogor Agricultural University in Indonesia. At the age age of 27 Diana received a master degree in Diponegoro University. And she received a Doctor's degree at Bogor Agricultural University Sandwich-like with Gyeongsang National University in 2015. Her research field is Fibrinolytic Protease from Microbials of Red Oncom Fermented Foods and Tempe Gembus. After graduation, she began work in Department of Nutrition Science, Faculty of Medicine, Diponegoro University as Lecturer. She previous research interest were bioactive peptide and protein from tempe gembus (fermented food) and fortification on kefir. Currently in addition to this, Starch resistant on Pisang Batu (*Musa balbisiana colla*) enzymatic modified for functional food ingredient. Dr. Diana were member of Persatuan Ahli Gizi Indonesia (Persagi) in 2017 and Persatuan Ahli Teknologi Pangan Indonesia (PATPI) from 2008 until now.

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