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# Simple Borax Qualitative Test in Benangkah Village, Bangkalan Regency

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A B S T R A C T

Indonesia has a low level of awareness of health and food safety. This is proven by the fact that there are still many foods in circulation that contain harmful preservatives such as borax. Borax is a food additive used to increase food shelf life, shape, taste, and texture. The purpose of this community service is to educate the people in Benangkah village regarding the dangers of borax and how to identify it using simple tools and materials. The method used is the lecture method and demonstration simulation. The results of the community service showed that several food samples positively contained borax which was indicated by a change in color to brownish red after being dripped with turmeric solution.

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**INTRODUCTION**

Food is a primary human need that must be met and is related to human survival. Due to the importance of the position of food, food safety needs to be a concern. In Indonesia, food safety is a health issue that needs serious attention from the government, producers, and consumers (community). Food safety and quality are the responsibility of food producers, while supervision of the safety of food sold in the community is the responsibility of consumers, and then reprimanding and overseeing the safety of food circulating in the community is the responsibility of the government[1,2,3].

Safe, quality and nutritious food will have a great impact on people's lives because it will affect the growth, maintenance, and improvement of people's health levels. In addition, it can also affect the increase in people's intelligence[4].

Food is said to be safe if it is free from three things, free from physical hazards, biological hazards, and chemical hazards. Food is said to be free from chemical hazards if it does not contain harmful food additives such as borax. One of the causes of food poisoning is due to the presence of borax contained in the food consumed[5].

Currently, many food manufacturers are adding borax to their products, to increase profits with food products that are more attractive, durable, more supple, and can improve texture[6,7]. Borax can effectively increase product durability, and prevent oxidation of food so that food does not go rancid quickly. According to Rohman (2012), borax is easily found by manufacturers and purchased at very low prices.

Borax is a chemical in the form of sodium tetraborate ($NaB_4O_7$) in solid form. In the industrial world, borax is widely used as a wood preservative, soldering agent, cleaning agent, insect cockroach repellant, and metal brazing[9,10].

Regulation of the Minister of Health Number 033 of 2012 states that Borax as a food additive includes hazardous and toxic chemicals. Consumed borax can cause health problems in the short or long term, so its use as a food additive is not permitted[11].

Borax that is consumed even in low doses can accumulate in the body and trigger cancer, disrupt the central nervous system, and damage organs such as the kidneys and liver.[12,13,14] If consumed at high doses, namely 5 g/kg of children's body weight and 10-20 g/kg of adult body weight, it can cause depression, decreased blood pressure, poisoning, and even death[6,15].

There have been many studies that prove the use of an additional ingredient, namely borax in snacks, especially those sold by traders in villages or front of elementary schools. Test results for meatballs circulating in elementary schools found that 7 out of 24 types of meatballs were positive for

borax[5]. Borax is also found in wet noodles circulating in the city of Padang with levels of 557.14 ppm[16]. Apart from that, there have also been reports of borax in siomay, cilok, and sausages[17,18]. BPOM also reported that 176 samples of food types from the total TMS parameter in Indonesia were positive for borax[19].

Borax contained in food can be detected with natural ingredients and a simple way, solution of turmeric. Turmeric can be used as a natural indicator of the presence or absence of turmeric because turmeric contains an active ingredient in the form of curcumin. This compound can decompose borax bonds into boric acid and bind it to a rosocyanine color complex (brownish red) in an acidic environment, causing a red-orange to red color in food products containing borax[20].

Communities in Indonesia, especially those living in rural areas, have a lack of knowledge and information regarding the dangers of borax and how to detect the presence or absence of borax in food, so community service activities are carried out. This activity aims to educate the public about the dangers of borax and how to identify it with simple tools and materials.

## IMPLEMENTATION AND METHODS

Community service was carried out in Benangkah Village on January 26, 2023. This activity involved lecturers as resource persons, students as assistants, and 25 people from benangkah village. The stages of implementing this community service include (1) Socialization, resource persons presenting about Borax and its dangers, (2) Demonstration, namely testing borax on samples of several foods using turmeric solution, (3) Discussion, question and answer, conducted by resource persons and the community. The tools used are a container, spoon, mortar pestle, and grater. The ingredients used are turmeric, water, Bakso, pentol, tahu, kerupuk, and ikan asin.

## RESULTS AND DISCUSSION

This Community Service Activity was attended by the community in Benangkah village, ranging from teenagers to adults. Documentation of the activity is shown in Figure 1. In this activity, participants were educated about the dangers that threaten when someone consumes food containing borax and the safe limits for consuming borax. Participants were very enthusiastic about this activity because there were still many participants who did not know what borax was and how dangerous it was for health. Based on the results of interviews with the participants, it was found that they had only heard the word dangerous borax on television, but did not know if borax could be in the food they usually eat. In addition, they also do not know how to identify the presence or absence of borax in food.

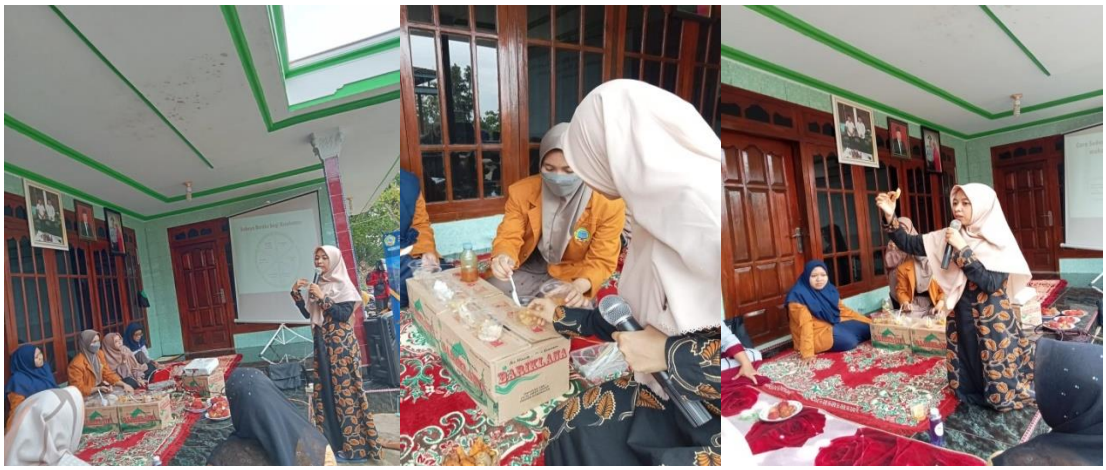

Figure 1. Socialization of the Dangers of Borax and a Demonstration of How to Test It

Demonstrations related to how to identify the presence of borax in food were carried out after the socialization ended. Test results for samples using turmeric water are shown in Table 1. Based on the table, it is known that there are samples that positively contain borax, namely pentol A and Kerupuk puli. This is indicated by the color change to brownish red in the sample when it is dripped with turmeric water[20]. This red color is produced from the color of the complex compounds between the curcumin compounds in turmeric and the boron compounds in borax[21]. Samples that did not contain borax did not change color when added to turmeric water. If the color change, it is caused by the presence of curcumin compounds in turmeric which can be used as an indicator, namely as a detector for borax in food. The reaction that occurs is[22] :

$$Na_2B_4O_7 + C_{21}H_{20}O_6 \rightarrow B[C_{21}H_{19}O_6]_2Cl$$

Borax + curcumin result in Rosocyanine

Table 1. The Results Test of Borax on Samples

| No | Sample | Test result | |
|---|---|---|---|
| 1 | Bakso A | yellow | (-) |
| 2 | Bakso B | yellow | (-) |
| 3 | Pentol A | Reddish-brown | (+) |
| 4 | Pentol B | yellow | (-) |
| 5 | Tahu putih | yellow | (-) |
| 6 | Tahu pentol | yellow | (-) |
| 7 | Kerupuk Putih | yellow | (-) |
| 8 | Kerupuk puli | Reddish-brown | (+) |
| 9 | Ikan Asin | yellow | (-) |

This activity ended with a question and answer session with participants and discussed the dangers of borax in food. Participants' understanding regarding food safety or borax-free is very important because many people are not aware that the material they use is dangerous borax. This is due to differences in terms or language used in each region such as bleng, pijer, kettek, cetitet, sode[23].

## CONCLUSIONS AND RECOMMENDATIONS

Education on the dangers of borax and how to identify it in Benangkah village received great enthusiasm from the community. After this activity, the community knows the dangers of borax and how to identify it using an ingredient that is easy to find in the kitchen, namely turmeric. The detection of borax indicates that there are traders who add borax to the food products they sell. Therefore, in the future, it is necessary to educate food industry producers about the dangers of using borax for health. And for further research, researchers hope that it is necessary to test the borax content using a quantitative method using modern tools such as GC-MS and HPLC.

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