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Local Wisdom of Kaur District's *Gulai Kasam* as A Source of Learning Biology in Biotechnology Material

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ABSTRACT

Local wisdom can be integrated into education through learning resources. Gulai Kasam is an example of local wisdom owned by the people of Kaur district, Bengkulu Province which can be used as a biology learning resource. The aim of this research is to identify the potential of gulai kasam as a biology learning resource, especially in biotechnology material. The type of the research used is descriptive qualitative with the research subject local wisdom where the author examines and describes the potential of local wisdom of gulai kasam by linking the fermentation process that occurs in making Gulai Kasam and what ingredients are found in the manufacturing process which is used as a biological learning resource. The research was carried out in Selika village, Bengkulu Province in April 2023. The data that had been obtained was then described through the stages of data reduction, data presentation, data conclusion. The results showed that gulai kasam has the potential to be a source of learning biology on biotechnology materials because in the manufacture of gulai kasam there are fermentation processes that can be used as an alternative so that students can more easily understand traditional biotechnology.

Keywords: biotechnology, biology, gulai kasam, local wisdom.

INTRODUCTION

Indonesia is a country that has ethnic and cultural diversity spread across various regions. This makes Indonesia have different potential and local wisdom in each region. There are still many people who uphold traditional elements in their lives. These traditional elements cover various domains such as dance, medicine, language, agriculture, and also include regional specialties (Sriyati et al., 2021). With the diverse culture of the Indonesian nation, it is fitting that these noble values be maintained. These values are also called local wisdom which can be used as a learning resource with various approaches (Ni'mah et al., 2021; Ramdani, 2018).

Local wisdom is positive values that have elements of harmony and balance between the needs of society and nature (Fitri et al., 2019). Local wisdom is a local idea, value, view that is wise, full of wisdom, has good value, and shared by members of the community. This makes local wisdom has positive values that are in line with national education goals (I. N.

Dewi et al., 2021; Kusuma, 2018). Local wisdom can create students can better appreciate nature and the culture that develops in society and take advantage of the knowledge they have and use this knowledge in solving various everyday problems (Solheri et al., 2022).

The values contained in local wisdom can be integrated into education because it is in line with the principles of education implementation contained in the education system Law no. 20 of 2003 article 36 paragraph 3, and Minister of Education and Culture Regulation No. 22 of 2016, which emphasizes the diversity of regional and environmental potential. (Nadlir, 2016) states that implementing local wisdom-based education has a positive impact on environmental conditions, psychological conditions, as well as sociological and cultural obstacles faced by students.

Local wisdom can be integrated into education through learning resources. Sources are all sources that contain messages, usually presented through learning tools/materials that are used for successful learning. Previous research that utilized local wisdom as a learning resource was by (Sriyati et al., 2021) namely utilizing the local potential of Dadiah as a biology learning tool to improve students' science process skills. (Pramesthi et al., 2020) also conducted research on the potential of herbs and spices used in local Buton cuisine as a biology learning resource. Next is research (Wulansari et al., 2022) who conducted research on sanjai chips in Bukittingi City which were developed as biology teaching materials. Utilizing local potential in an area is one part of the information that can be used in the learning process. By utilizing local potential, students can increase activity and create a curious attitude so that the learning carried out is more meaningful (Gusmar et al., 2022).

Science learning places great emphasis on process skills in discovering knowledge packaged in the principles of the scientific method. Scientific methods and knowledge actually consists of all knowledge related to facts that exist in society. This knowledge comes from beliefs passed down from generation to generation. The scope of original scientific knowledge includes the fields of science, agriculture, ecology, medicine and the benefits of flora and fauna (Lia et al., 2016). These aspects are also known as local wisdom that develops in society. Through local wisdom, learning and transferring concepts in science learning will become more meaningful and contextual (Lidi et al., 2020).

Gulai Kasam is a type of local wisdom that can be applied to science learning. Gulai kasam is a typical food owned by the people of Kaur district, Bengkulu Province. Gulai kasam is a type of curry whose main ingredient is rice mixed with buffalo meat, beef or fish which is fermented for 1-2 days. In the process of making gulai kasam, biological processes are applied to it, which is very suitable to be used as learning material based on local wisdom.

The process of making gulai kasam also uses various types of spices which can also be used as a biology learning resource. However, in reality, this typical food is rarely known by the public, especially the younger generation. Therefore, it is important to conduct a study regarding this gulai kasam which has the potential to become a learning resource in schools. Based on the description above, the author feels it is necessary to conduct an in-depth study

of the local wisdom of gulai kasam from an educational perspective which can be used as a biology learning resource. The aim of this research is to identify the potential of gulai kasam to be used as a biology learning resource.

METHOD

The type of research used is descriptive qualitative research with the subject of local wisdom of gulai kasam where the author examines and describes the potential of local wisdom of gulai kasam as a source of learning biology. The research was carried out in Selika village, Tanjung Kemuning District, Kaur Regency, Bengkulu Province in April 2023. The resource persons in the research were Selika village residents who still inherited and understood the making of this typical food. The technique used in collecting data is a combination of observational data by looking at the process of making gulai kasam, as well as interviews regarding the tools and materials used and how long the fermentation process, as well as reviewing the content of each ingredient used through literature study. The data that has been obtained is then described through stages, namely data reduction, data presentation, data conclusion. The potential or suitability of gulai kasam as a learning resource is assessed based on the following criteria a) economical, b) practical, c) flexible, and d) suitability to learning objectives. Next, the data collected is then analyzed by providing a feasibility score according to Table 1.

Table 1. Learning resource criteria assessment scores

Score	Information	Descriptor
4	Very economical	The distance from the school is very close, namely 0-2.5 km
	Very practical	Very easy to implement
	Very Flexible	More than 2 appropriate basic competencies
	Very Suitable for purpose	All learning resource components are in accordance with the learning objectives
3	Economical	The distance from the nearest school is 2.6-5.0 km
	Practical	Easy to implement
	Flexible	Consists of 2 appropriate basic competencies
	Suitable for purpose	Most of the learning resource components are all in accordance with the learning objectives
2	Not economical	The distance from the school is 5.1-7.5 km
	Not practical	Not easy to implement

	Not flexible	Only consists of 1 basic competency
	Not fit for purpose	A small number of learning resource components are all in accordance with the learning objectives
1	Very uneconomical	The distance from school is very far, namely 7.6-10.0 km
	Very impractical	Very difficult to implement
	Very inflexible	Not in accordance with basic competencies
	Completely unfit for purpose	The components of learning resources are not in line with the learning objectives

Source : (Arikunto, 2010)

The total score values that have been obtained are then converted into feasibility quality values. The values that have been obtained are then qualitatively based on the rubric in Table 2 and then described.

Table 2. Learning resource appropriateness assessment scale

Range	**Description**
75% - 100%	Completely meets the criteria
50% - 75%	Meet the criteria
25% – 50%	Does not meet criteria
0% – 25%	Completely does not meet the criteria

Source :(Arikunto, 2010)

RESULT AND DISCUSSION

Gulai kasam is a typical dish in Kaur district, Bengkulu province. This curry was made using fermented beef and rice as the main ingredients. The meat and rice were fermented for approximately 1-2 days and then cooked again using other kitchen ingredients such as galangal, ginger, turmeric and coconut milk. The process of cooking gulai kasam generally took approximately 30 minutes after fermentation is complete. The aroma of this gulai kasam is very distinctive, namely the aroma of a combination of fermentation results.

Table 3. Summary of interview results for making gulai kasam

No	Component	Explanation
1	Gulai kasam making area	The southern part of Bengkulu, especially the Kedurang and Kaur districts
2	Ingredients for making gulai kasam	Buffalo meat, rice, lemongrass, turmeric, galangal, chili, coconut milk
3	Container used for fermentation	In the past, people used bamboo, but now most people use tools that are easier to obtain, such as jars
4	Gulai kasam making process	Buffalo meat mixed with rice, fermented for 1-2 days then cooked using kitchen spices and coconut milk. In the process of making Gulai kasam, it is known that when fermenting meat and rice, the process is mixed with kitchen spices such as galangal, turmeric, garlic and shallots, lemongrass and ginger. This is in line with the opinion that plants contain several active antibacterial compounds which can inhibit and stop bacterial activity.

The process of making gulai kasam and spices which is used as a biological learning resource for biotechnology material

Gulai kasam has the potential to be a source of learning biology for biotechnology material because in biotechnology it is closely related to the fermentation process. Many food products consumed by Indonesian people go through a fermentation process, one of which is gulai kasam. Biotechnology also studies and utilizes the microorganisms involved in each fermentation process. In gulai kasam fermentation process, it is known that buffalo meat is boiled first, then mixed with cooked rice and mixed with various kitchen spices and left for 1-2 days.

Boiling buffalo meat before fermenting has the benefit of helping to kill pathogenic bacteria and microorganisms that may be present in the meat. Bacteria such as Salmonella, E. coli, and Listeria monocytogenes are examples of pathogens that can cause illness if consumed in large enough quantities. By boiling the meat first, the risk of infection and food poisoning can be reduced (Setiarto, 2020).

In the process of making gulai kasam, it is known that when fermenting meat and rice, the process is mixed with kitchen spices such as galangal, turmeric, garlic and shallots, lemongrass and ginger. This is in line with opinion (Zukmadini et al., 2020) that plants contain

several active antibacterial compounds that can inhibit and stop bacterial activity. According to(Akbar et al., 2022) Lemongrass is often used in the fermentation process because this kitchen spice contains compounds that can help the fermentation process, including flavonoids, essential oils and polyphenols. (Suradi et al., 2018) states that lemongrass is rich in citral, which is often used for fragrance and pharmaceutical industries. The use of lemongrass (Cymbopogon citrates) as a spice in making gulai kasam is useful for generating flavor and is believed to also be used in traditional medicine, so that lemongrass can be classified as a natural preservative, because lemongrass contains phytochemical compounds including saponins, tannins, alkaloids, flavonoids and oils (Hamza, I. S., Sundus, H. A., and Hussaine, 2009).

Furthermore, in the fermentation process of gulai kasam, galangal is also used, galangal is known to have many benefits. According to the statement (Hapsari et al., 2021) that galangal contains various compounds such as flavonoids and terpenoids, where these compounds can provide a distinctive aroma to the fermentation results. Apart from that, galangal also has antimicrobial properties which can prevent the growth of bacteria during the fermentation process. The flavonoids in galangal work as antimicrobials by binding to proteins through hydrogen bonds, causing the protein structure to become damaged, the instability of cell walls and cytoplasmic membranes to be disturbed. Disruption of cytoplasmic integrity causes the escape of macromolecules from ions so that the cell loses its shape and becomes lysed (Andhari, 2019).

The next ingredient used in gulai kasam fermentation process is turmeric. Turmeric is one of the kitchen spices that is often used in the fermentation process because it contains curcumin compounds and essential oils, where these compounds can make antimicrobials a good ingredient to use in the fermentation process. Apart from that, turmeric also provides a distinctive aroma and taste of fermented products (Aulia *et al.,* 2018). In the field of food safety, the essential oils contained in turmeric provide antimicrobial effects, so they can be used to preserve food (Antara et al., 2015).

The next ingredient is ginger, ginger is used in gulai kasam fermentation process with the aim of providing aroma to the fermented product. Gingers is known to contain 0.25 – 3.3% essential oil (ginger oil) carrying the aroma of ginger (the typical aroma of ginger) and this oil consists of several types of the most important oils, namely zingiberene, curcumene, philandren. Ginger also has many benefits, including the treatment and prevention of various diseases (Haroen *et al.,* 2018).

Garlic is also one of the ingredients used in the fermentation process of gulai kasam. Garlic has a distinctive taste and aroma, which can add additional flavor to fermented products. When used in the fermentation process, garlic can provide a spicy, sharp touch and a distinctive smell to fermented products. The compounds in garlic can help in the enzymatic modification process, break down protein complexes, and improve the texture of fermented products. Shallots are also used in the fermentation process of gulai kasam. Shallots are a spice that is usually used as an additional ingredient in food. Red onions function to enhance the distinctive taste of food.

Food that uses red onions becomes more savory and delicious. Apart from functioning as a food additive, red onions also have antimicrobial properties so they can inhibit the growth of bacteria that can spoil food. According to (Pramesthi *et al.,* 2020) herbs and spices can be used as learning resources and to support learning activities because they are contextual or related to students' daily lives. Maximum use of herbs and spices in the learning process will help students understand the lesson materials, where in this process students can relate the material being studied to real conditions in their environment.

Based on the explanation above, there are a lot of biological materials that can be studied in the process of making *gulai kasam*. (Ramdani, 2018) stated that learning by utilizing local wisdom does not only provide information sourced from community values, but also instills character values in students' daily lives. Apart from being taught in biotechnology material, the process of making gulai kasam can also be used as learning material regarding the properties of the various types of spices used and their benefits in the fermentation process.

The feasibility of Gulai kasam as a source of learning biology for Biotechnology material

The suitability of the local wisdom of gulai kasam as a learning resource was analyzed following the following four criteria 1) economical, 2) practical, 3) flexible and 4) appropriate for the purpose. The results of the feasibility analysis are summarized and presented in Table 3.

Table 3. Results of assessment of the suitability of gulai kasam as a learning resource

No	Name	Research result				Average	Category
		Economical	Practical	Flexible	According to purpose		
1	*Gulai Kasam*	3	3	4	4	3.5	Completely meets the criteria

Table 3 shows that gulai kasam has the potential or is worthy of being used as a biology learning resource because it meets the criteria of economic, practical, flexible and fit for purpose. For the first category, namely the economic aspect, it is known that the distance between the school and the Tanjung Kemuning sub-district community is very close, namely in the range of 1-2 km. Gulai kasam for the second criteria is practical value because of the ease of making this gulai kasam. There are still many people around Tanjung Kemuning District, Kaur Regency who understand the process of making gulai kasam.

The third criteria is very flexible because it can be presented as a biology learning resource for two basic competencies. The fourth criteria for gulai kasam is categorized as very appropriate to the objectives because the components and processes involved in making gulai kasam are in accordance with the learning objectives in several basic competencies.

Biotechnology material requires learning resources that can be directly observed by students. The material in biotechnology is abstract so it requires supporting learning media(Duda

et al., 2022). Biotechnology is a subject whose content requires direct application when studying it. Biotechnology that utilizes local wisdom is one way to make biotechnology material easier to understand. The existence of biotechnology based on local wisdom is able to develop student competencies through the science process in it. These competencies can cover the cognitive, affective and psychomotor domains of students (Forniawan, 2022). One way to make students understand biotechnology material better is by introducing the fermentation process.

Research on fermentation in increasing understanding of biotechnology material has been carried out by(Rosliana *et al.,* 2022). This research examines the influence of salt concentration and fermentation time on the quality of shrimp paste as a design for a high school biotechnology booklet. The results of the research experiment were used as a booklet as teaching material on biotechnology material for Biology learning in class XII high school.

Gulai kasam is one of the local wisdoms that has the potential to be a source of learning biology and biotechnology materials. In making gulai kasam there are fermentation processes which can be used as an alternative teaching medium so that students can more easily understand biotechnology material. According to the statement (Iza & Sari, 2021) Using appropriate learning media can help convey learning content effectively and can increase students' understanding. Apart from that, by making the curry kasam object into biology learning, it can increase students' love of local culture. The use of gulai kasam as a learning resource is in accordance with the definition of the benefits of learning resources by (B. Dewi *et al.,* 2020) namely as a support for learning process activities, adding and expanding the presentation of material that may not be summarized in the textbook.

The use of gulai kasam will make it easier for students to understand the concept of biotechnology and also the benefits of ingredients in the form of spices in it. In the process of making gulai kasam, students can learn directly from real processes that exist in everyday life, thus increasing students' enthusiasm and enthusiasm in participating in the biology learning process. This is in line with opinion (Wardianti & Jayati, 2018) that the material in biology learning should be directly related to the real environment around students.

The use of regional specialties as a source for learning biology based on local wisdom was also developed by(Rikizaputra et al., 2022) which examines the potential of eating green sticky rice as a biology learning resource. The results of this research show that the process of making green sticky rice can be used as a representative and contextual learning source for several basic competencies in biology learning. Furthermore, research conducted by (Ami & Yuliana, 2020) The results of this research show that there are nine domains of plant types used in the three typical Jombang traditional foods so that they can be used as a learning resource for material on the structure of plant development. Other research was conducted by(Hadi *et al.,* 2020) Based on his findings, he concluded that making Madurese shrimp paste can not only be used as a learning resource but can also foster local wisdom values and student character. (Putra, 2017) emphasizes that local culture-based learning is contextual learning designed by integrating

local culture in learning with the aim of providing apperception material, to motivate and apply knowledge.

In the end, it can be concluded that the use of local wisdom as a learning resource emphasizes the concept of constructivism. Constructivism is a philosophy of contextual learning where students are guided to reconstruct the knowledge that exists within themselves and make this knowledge meaningful for themselves and their environment.(Lidi et al., 2020). Based on the results of the researcher's findings and several previous research findings that have been described, it shows that biology learning resources taken from local wisdom can help the learning process become better.

CONCLUSION

Based on the description above, it can be concluded that the local wisdom of the people of Kaur Regency, namely curry kasam, has the potential to be used as a biology learning resource, especially in learning biotechnology material. On the other hand, it can also be used as a means of introducing the local wisdom culture that exists in students' environment as well as the positive values in the local wisdom of gulai kasam. Integrating local wisdom in education will have an impact on students' enthusiastic attitude in studying learning material because the learning resources used are very close to their daily experiences. Thus, integrating local wisdom in education can be used as a solution in creating innovative learning for the development of education in a better direction.

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