

Plant blindness profile of high school students in Hulu Gurung sub-district, Kapuas Hulu district

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Abstract: People often forget about plants as living organisms that are essential for life which characterizes plant blindness. Plant blindness can occur in students. The objectives of this study are identifying plant blindness in high school student in Hulu Gurung. This research was conducted in January 2023 in the even semester of 2022/2023. The population in this study were all students of SMPN 1 Hulu Gurung (Junior High School) and SMAN 1 Hulu Gurung (Senior High School). Sample selection using Simple Random Sampling technique. The instruments used were questionnaires and direct interviews. Methods for data analysis using qualitative descriptive methods. The results showed that students still lack knowledge about local vegetables. The percentage of students recognizing vegetables was 15% in senior high school students and 4% in junior high school students. There were 6 vegetable species that were not recognized at all, namely *Solanum lasiocarpum*, *Ficus sp.*, *Mangifera pajang*, *Polypodium sp.*, *Ficus sp.*, and *Smilax leucophylla*. In the future local vegetables can be better recognized amidst the presence of imported vegetables. The diversity of local vegetable crops must be maintained through conservation strategies, one of which is to avoid plant blindness as early as possible.

Keywords: junior high school; local vegetable; plant blindness; senior high school; West Kalimantan

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Introduction

Building more knowledge about plants is one way to add insight into conservation. One of them is knowledge about plants that are only in certain areas or commonly called local plants. Plant blindness is one of the phenomena that commonly occurs in students, especially in biology subjects. People tend to ignore plants as living organisms, usually seeing them as a simple background. According to Bar-on *et al.* (2018), plants tend to be underrepresented in biology curricula despite being underrepresented in biology curricula despite being indispensable to all other life on earth and highly prevalent in the biosphere. As Knapp (2019) says, human would regret a world without tigers or pandas, but a world without plants is unimaginable. After all, life on earth would not take place without plants, hinting at how important plants are to life and the dangers of not recognizing plants. In fact, when viewed from the benefits, plants are very beneficial for life on earth. As said Siboro (2019), plants create oxygen and clean air pollution, providing the quality of air needed for human breathing and other life. Plant appreciation is not just about looking at plants, it can also be the direction of all our senses and emotions (MacKenzie *et al.*, 2019). The results of a study conducted by Balas & Momen (2014) on informed that there are fundamental differences in the way plant material is delivered that may contribute to plant blindness. This is also reinforced by Abrori (2020) which states that learning loss during the pandemic increases plant blindness for Biology Education Students, University of Borneo Tarakan.

The forest area in Bukit Beluan, Hulu Gurung Sub-district, Kapuas Hulu District, West Kalimantan is a secondary forest area (Sari *et al.*, 2015). Shifting cultivation in the local language of Hulu Gurung Sub-

district is called *uma*. *Uma* or shifting cultivation is land clearing by the community to fulfill their daily needs by planting rice and vegetables. The shifting cultivation method is carried out through the process of clearing land with a predetermined area, the forest is then cut down and burned, then grown with various food plants such as rice, corn, and cassava (Rifki, 2017). Not a few local vegetables are grown in *uma* fields. From the results of interviews conducted on October 4, 2022 with biology teachers at SMAN 1 Hulu Gurung, they have never used local plants as a source of learning biology at school. The role of teachers is important in overcoming the phenomenon of plant blindness. Learning approaches that are most likely to be effective will (1) make plants relevant in students' daily lives, (2) engage multiple senses at once (e.g., visual and tactile), and (3) build on previously learned information to make deeper connections (Krosnick et al., 2018). Only in relation to plants does it meet the attention of students to be able to open a window of opportunity to avoid them from the perception of plants being just a natural panorama for animal life and to allow students to promote more realistic thinking about nature, without ignoring the vast majority of organisms that build the foundations of life on earth (Pany, 2016). In fact, Margulies et al. (2019) suggested that plants should be considered part of the animal kingdom so that they become as important as animals in efforts to tackle plant blindness.

Plant blindness is like a person who sees nature as perfect but is unable to create diversity in it. This is one of the signs of an inability to pay attention to plants (Çil & Yanmaz, 2017). As with attitudes, this aspect of "plant blindness" has also not been studied as comprehensively as knowledge and interest attention (Parsley, 2021). However, Acacio et al. (2019) mentioned that plant blindness has recently begun to be studied because it has been reviewed as a major problem in the environment. After an in-depth review, it was found that research on plant blindness among secondary school students had never been conducted in Indonesia. Only a few publications report research related to plant blindness, for example in Turkey (Bakar et al, 2020) and Austria (Pany, 2014). In line with that, research regarding blindness in Indonesia is still difficult to find. One of the plant wealth owned by an area is local vegetables. Local vegetables with another name indigenous vegetables are one part of the biodiversity that Indonesia has and is known as the Mega Biodiversity Country. The utilization of local vegetables can be an effort for conservation strategies as well as the utilization of local vegetables (Susanti, 2016). Therefore, the purpose of this study was to determine the percentage of plant blindness in students of SMPN (State Junior High School) 1 Hulu Gurung and students of SMAN (State Senior High School) 1 Hulu Gurung. It was also considered necessary to provide an overview of plant blindness to junior and senior high school students in Hulu Gurung District. In the future, it is also a place to introduce local vegetable types in addition to learning resources but also as a way to maintain the conservation of these vegetables.

Method

This study is a descriptive study. The test was conducted by showing 30 types of local vegetables. Students were then asked to write the name of the local vegetables contained in the questionnaire. The results that have been obtained are then percentage to determine the level of correctness of the plant name. The sampling technique in this study used Simple Random Sampling technique. The samples in this study were students in grades VII, VIII, and IX of SMPN 1 Hulu Gurung totalling 95 students and students in grades X, XI, and XII of SMAN 1 Hulu Gurung totalling 186 students. To complete the primary data, interviews were conducted with biology teachers of SMAN 1 Hulu Gurung and SMPN 1 Hulu Gurung. The instruments in this study were observation sheets, interview guidelines, questionnaires, and documentation tools in the form of digital cameras. Data analysis in this study by collecting data, data reduction by analyzing interviews, analyzing student questionnaires, analyzing learning resource questionnaires. Furthermore, in the data analysis, data presentation and descriptive conclusions are described in the form of a percentage of the correctness of each student's answer on each type of plant for each school. Based on the results of the percentage, it is then described how the comparison of the percentage of blind plant names of SMPN 1 Hulu Gurung and SMAN 1 Hulu Gurung students. This research was conducted in the odd semester of 2022/2023. The research location is local vegetables in Landau Kumpang Village and Nanga Tepuai Village, Hulu Gurung District, Kapuas Hulu Regency. Blind plant identification was conducted on students of SMAN 1 Hulu Gurung and students of SMPN 1 Hulu Gurung. The formula used to determine the percentage of plant blindness is as follows:

Formula : $P = F/N \times 100\%$

Description : P = Percentage

F = Minimum Score

N = Maximum Score

Then, the percentages obtained are categorized based on the criteria presented in Table 1. Furthermore, the data in this study were analyzed using statistical methods as in the Table 2. The local vegetables used in the questionnaire were obtained from direct interviews with the community and identification at Beluan Hill. The photos used were taken directly from interviews with people around Beluan hill. The questionnaire test in this study was conducted for 30-45 minutes. Students are asked to write the local

name of the vegetables in the picture. Students have about 1 minute for each number. The correct answer will get a value of 1, while if the answer is wrong, a value of 0 will be given (Abrori et al, 2021).

Table 1. Plant blindness percentage criteria

Criteria	Value Interval %
Easy to recognize	≥ 70
Difficult to recognize	≤ 70

(Abrori et al, 2021)

Table 2. Statistical methods

Research Question	Statistical Methods
How well do students recognize local vegetables?	Average (means)
Which local vegetables are most recognizable?	Frequency

(Kaasinen, 2019)

Results and Discussion

After the questionnaire distributed on SMPN 1 Hulu Gurung students and SMAN 1 Hulu Gurung students, the data was then presented as a percentage. There are several data that are presented as a percentage, namely the value per vegetable item, the value per student and the value per school. The results of these values are presented in the form of a table. Furthermore, interviews were conducted with students then the results of the interviews were presented in the form of bar charts. From the results of the questionnaire test conducted on SMAN 1 Hulu Gurung students and SMPN 1 Hulu Gurung students, the results are obtained in the form of percentages in the Table 3.

Table 3. Percentage of plant blindness in junior and senior high school in Hulu Gurung district

Name of Vegetable		Student recognize local vegetable (%)	
Local Name	Species	SMPN 1 Hulu Gurung	SMAN 1 Hulu Gurung
Pinat	<i>Benincasa hispida</i>	10	35
Umbut	<i>Eugeissona utilis</i>	100	100
Rotak tanduk	<i>Abelmoschus esculentus</i>	100	99
Pusut	<i>Luffa acutangular</i>	100	96
Terong asam	<i>Solanum ferox</i>	99	82
Daun bidau	<i>Gnetum gnemon</i>	75	88
Terong bulu	<i>Solanum lasiocarpum</i>	0	20
Daun entimun	<i>Cucumis sativus</i>	60	89
Daun rongi	<i>Cucurbita moschata</i>	70	88
Kangkang	<i>Smilax</i> spp.	100	100
Pakuk nait	<i>Stenochlaena palustris</i>	100	97
Pakuk kubuk	<i>Nephrolepis biserrata</i>	96	97
Daun seluai	<i>Ficus</i> sp.	24	36
Pakuk ikan	<i>Diplazium esculentum</i>	91	93
Daun konang	<i>Covellia racemifera</i>	50	72
Daun selasih	<i>Passiflora foetida</i>	45	91
Daun mawang	<i>Mangifera pajang</i>	0	0
Daun banar	<i>Smilax perfoliate</i>	44	72
Pakuk langkat	<i>Polypodium</i> sp.	0	2
Daun longkan	<i>Ficus</i> sp.	81	98
Daun emprokak	<i>Smilax leucophylla</i>	0	0
Daun entrokup	<i>Ficus</i> sp.	0	0
Daun sengkubak	<i>Pycharrhena cauliflora</i>	0	0
Daun gelumang	<i>Ficus</i> sp.	0	0
Rongi	<i>Cucurbita moschata</i>	100	99
Entimun batang	<i>Cucumis sativus</i>	70	35
Robung	<i>Dendrocalamus asper</i>	86	98
Simpur	<i>Etlingera elatior</i>	46	78
Ensabi	<i>Brassica juncea</i>	78	75
Entimun solik	<i>Cucumis melo</i>	48	43

There are 6 types of vegetables that are not recognized at all. When viewed from the overall value of the percentage results per vegetable, there are 15 types of vegetables that have a value interval of $\geq 70\%$ so this indicates that the vegetables are easily recognizable (Table 3). For example, some of the vegetables featured on the student questionnaire test for plant blindness (Figure 1).

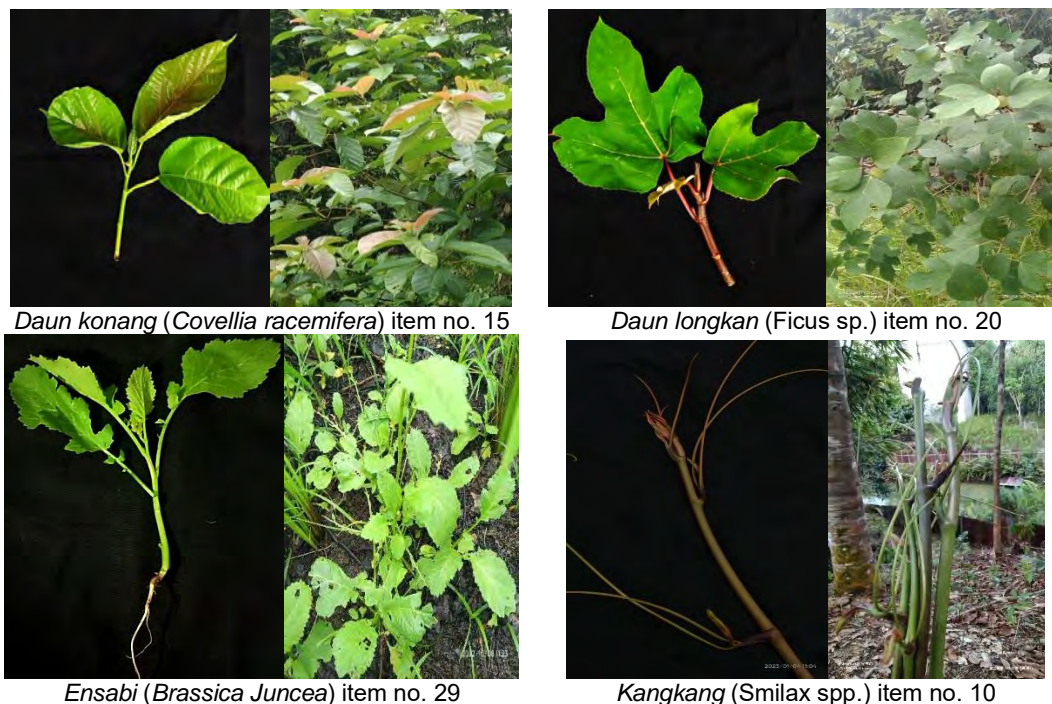


Figure 1. Some of the vegetables featured on the student questionnaire test for plant blindness

The vegetables in Figure 1. are local vegetables from Hulu Gurung sub-district. Photographs were taken during direct observation and interviews with related communities. The habitat of the vegetables varies as long as it is still within the scope of the Bukit Beluan area. After collecting 30 vegetables, they are then displayed in the questionnaire given to SMPN 1 Hulu Gurung students and SMAN 1 Hulu Gurung students. In addition to the results of the value per vegetable, scores for junior high school students and high school students were also obtained based on the age range of students (Table 4). Based on Table 4, students with an age range between 15-18 years old are better at recognizing local vegetables as shown by scores 15%. Furthermore, the most recognized vegetables of SMPN 1 Hulu Gurung students were 13 vegetables, while those of SMAN 1 Hulu Gurung students were 17 vegetables. Based on the data, high school students recognize more local vegetables well (Table 5).

Table 4. How well students from secondary schools in Hulu Gurung recognize local vegetables (by grade and age)

School	Percentage	
	Students with score ≥ 70	Students with score ≤ 70
Junior High School (grades 7-9, ages 12-15)	4%	96%
Senior High School (grades 10-12, ages 15-18)	15%	85%

Based on the results of interviews with students of SMPN 1 Hulu Gurung, there are 3 reasons students recognize local vegetables, namely 1. often see their parents cooking these vegetables, 2. planting these vegetables, 3. selling these vegetables. The most common reason why SMPN 1 Hulu Gurung students recognize local vegetables is around 86%, namely that students often see their parents processing these local vegetables. Furthermore, the highest reason is at 52%, with the reason that students and parents of students have planted these local vegetables themselves. The last reason at 12% is that students sell their local vegetables (Figure 2). The results of further interviews with SMPN 1 Hulu Gurung students regarding the reasons students do not recognize local vegetables are: 1. they have never seen these vegetables; 2. they have seen them but do not know the name; and 3. they have forgotten the name of

the vegetable.

As many as 54% of students did not recognize local vegetables because they had never seen the vegetables on the test sheet. Furthermore, about 80% of students did not recognize local vegetables because they had seen them but forgot the name of the vegetable. 96% of students answered that the reason they did not recognize local vegetables was because they forgot the name of the vegetables (Figure 3). Based on the results of interviews with students of SMAN 1 Hulu Gurung, there are 3 reasons students recognize local vegetables: 1. they often see their parents cooking these vegetables; 2. they plant these vegetables; and 3. they sell these vegetables.

Table 5. The most recognizable local vegetables based on the percentage of each student's answer (281 student)

Vegetables most recognized by students of SMPN 1 Hulu Gurung (95 student)	Vegetables most recognized by students of SMAN 1 Hulu Gurung (186 student)
<i>Eugeissona utilis</i>	<i>Eugeissona utilis</i>
<i>Abelmoschus esculentus</i>	<i>Abelmoschus esculentus</i>
<i>Luffa acutangular</i>	<i>Luffa acutangular</i>
<i>Solanum ferox</i>	<i>Solanum ferox</i>
<i>Gnetum gnemon</i>	<i>Gnetum gnemon</i>
<i>Smilax spp.</i>	<i>Smilax spp.</i>
<i>Stenochlaena palustris</i>	<i>Stenochlaena palustris</i>
<i>Nephrolepis biserrata</i>	<i>Nephrolepis biserrata</i>
<i>Diplazium esculentum</i>	<i>Diplazium esculentum</i>
<i>Ficus sp.</i>	<i>Ficus sp.</i>
<i>Cucurbita moschata</i>	<i>Cucurbita moschata</i>
<i>Dendrocalamus asper</i>	<i>Dendrocalamus asper</i>
<i>Brassica juncea</i>	Ensabi (<i>Brassica juncea</i>)
<i>Cucurbita moschata</i>	<i>Cucurbita moschata</i>
	<i>Covellia racemifera</i>
	<i>Passiflora foetida</i>
	<i>Smilax perfoliate</i>
	<i>Etingera elatior</i>

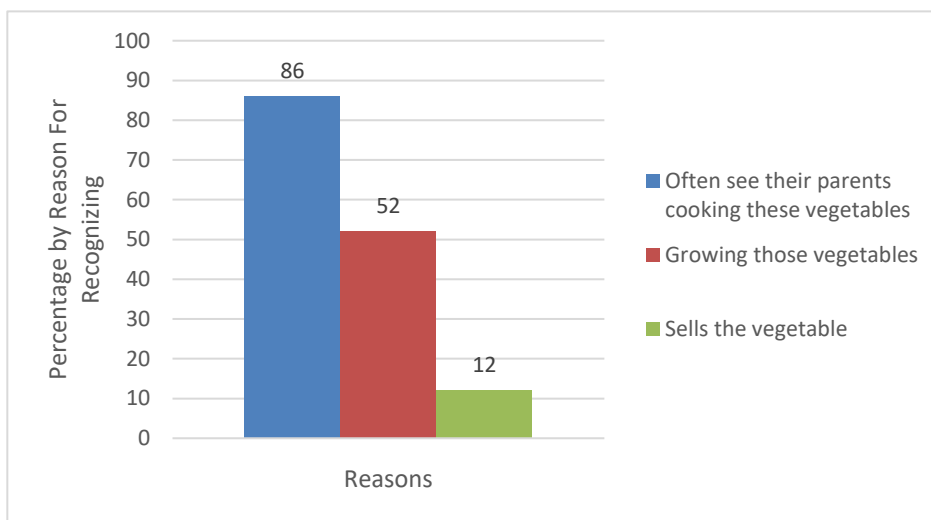


Figure 2. Diagram of reasons why SMPN 1 Hulu Gurung students recognize local vegetables

Students of SMAN 1 Hulu Gurung mostly recognize local vegetables because they often see their parents processing them; there are about 80% of students who have this reason. Furthermore, about 40% of students know vegetables because they grow them, so they often encounter, know, and recognize these vegetables. Another 18% of students know vegetables because they sell them. While the least common reason why students recognize local vegetables is because their parents sell them (Figure 4). The results of interviews conducted with students of SMAN 1 Hulu Gurung regarding the reasons students do not recognize local vegetables are: 1. they have never seen these vegetables; 2. they have seen them but do not know the name; and 3. they have forgotten the name of the vegetable.

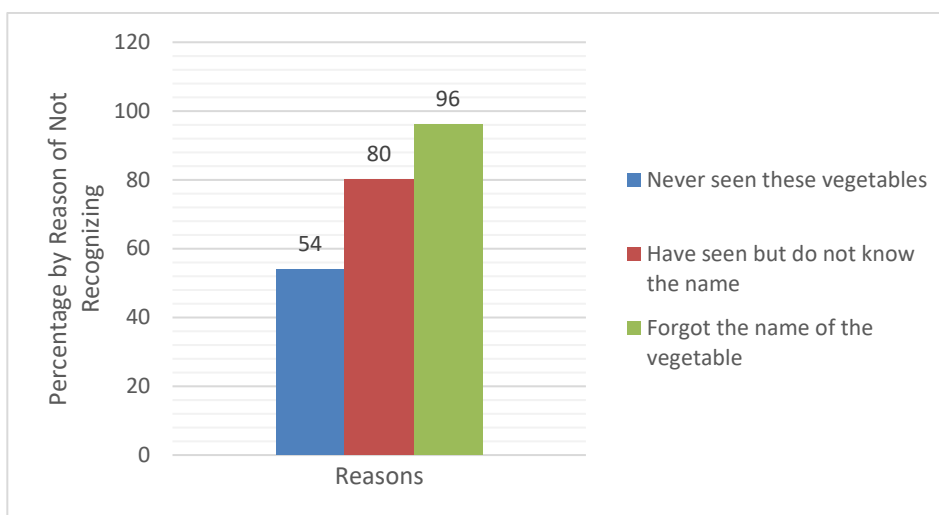


Figure 3. Diagram of reasons why SMPN 1 Hulu Gurung students do not recognize local vegetables

There were about 83% of students who reasoned that they forgot the name of the vegetable on the test sheet, which was the most common reason why the students of SMAN 1 Hulu Gurung did not recognize the local vegetable. The second reason was that students had seen the vegetable but did not know the name of the vegetable, there were about 72% of students who had this reason. While the least reason why students did not recognize the local vegetables was because students had never seen the local vegetables at 12% (Figure 5).

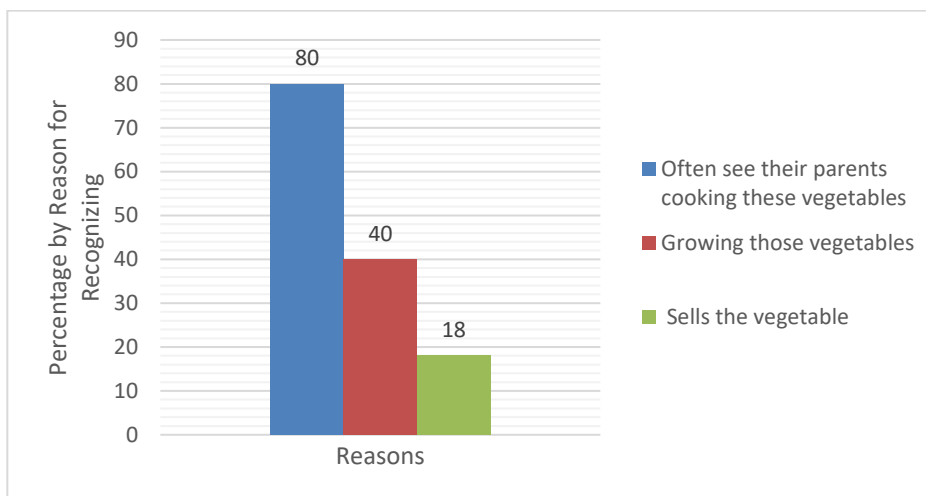


Figure 4. Diagram of reasons why SMAN 1 Hulu Gurung students recognize local vegetables

After conducting a questionnaire test to find out the percentage of plant blindness in students, interviews were then conducted with 2 groups of students, the first group is the group of students who have a percentage value of plant blindness above 70 and the second group is the group of students who have a percentage value of plant blindness below 70. Based on the interview results, there are 3 reasons why students recognize or do not recognize vegetables. The most common reason why students recognize the vegetables is because they often see their parents cooking the vegetables or in other words because they often consume the vegetables. While the most common reason why students do not recognize the vegetables is that students have seen the vegetables but do not know the name of the vegetables. From these reasons, it can be seen that students are less interested in knowing the species names of the plants they see, although they are often encountered and even utilize it for their daily lives. Thomas (2019) mentions a number of plants are created invisible, some are clearly visible, and some have images on them. Their interest and desire for knowledge about the plant is not something they are interested in knowing. They simply know that the vegetable is green and can be used by cooking without being interested in knowing the species name of the vegetable. This means that they actually have some general and some knowledge about plants, regardless of species variety (Bakar et al., 2020).

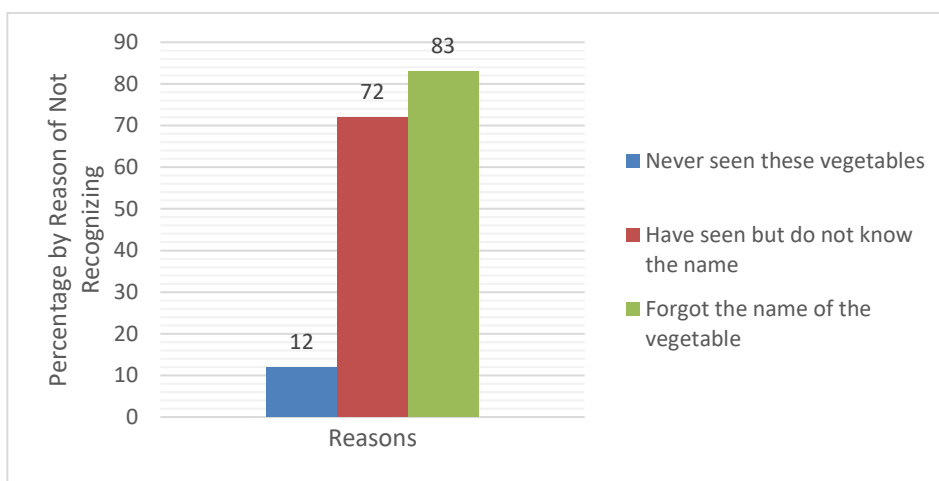


Figure 5. Diagram of reasons why SMAN 1 Hulu Gurung students do not recognize local vegetables

The results of the questionnaire test that has been conducted; it is known that there are 15 types of vegetables that are well recognized by students with an average score of ≥ 70 . Furthermore, from the data regarding how well secondary school students recognize local vegetables, it can be seen that high school students with an age range of 15-18 years get superior scores with 15%. When compared to junior high school students aged 12-15 years who scored 4%, senior high school students were 11% superior. In fact, plant blindness does not only affect high school students but also university students.

As mentioned by [Abrori \(2020\)](#) that students who attended plant taxonomy lectures at the University of Borneo Tarakan only recognized 5 plant species out of 20 plant species with a percentage of 60%. In this case it is said that plant blindness can be seen from the low percentage of the correctness level in recognizing plant names. It is even possible that they do not recognize local vegetables that they often encounter and consume. Some students interviewed also said that they only know these vegetables when they have been processed into dishes. They do not even know what the exact shape of the vegetable is before it is processed into cooking ingredients. There are even those who have never consumed and seen the vegetables at all, they recognize and know imported vegetables such as carrots and cabbage. There are many factors that cause students' lack of knowledge about plants, especially local vegetables. The increasing desire to rely on urban facilities and the economy directly reduces the meaning of plants as a source of food ([Stagg & Dillon, 2022](#)).

Curiosity about plants is not an interesting thing they need to know. Judging from the expertise of curiosity, teachers should introduce a lot of original materials and components found in nature to students so that students are more easily interested and explore the concepts that will later be taught to students ([Jannah et al., 2021](#)). There are many factors that cause students' lack of knowledge about plants, especially local vegetables. In fact, most schools have not used natural areas as learning resources in their learning, especially the ability of learning resources in each region ([Nurlaeliana, 2022](#)). From the interview previously conducted to the biology teacher at SMAN 1 Hulu Gurung, information was obtained that the teacher at the school had never used local vegetables as a biology learning resource. The role of teachers is of course important in overcoming the phenomenon of plant blindness, as said [Corrêa \(2020\)](#) although high school is a meaningful source that learns botanical content, but universally does not avoid plant blindness, at least there are school efforts in overcoming plant blindness. Specifically mentioned by [Fiel'ardh et al., \(2023\)](#) in the Indonesian situation, research is needed to incorporate the fundamentals of Education for Sustainable Development into the science teacher education system by emphasizing plant awareness, which is of utmost importance. [Stroud et al. \(2022\)](#) reported that plant learning in secondary schools is emphasized on bioenergy, reproduction, and minimal plant anatomy and ecology and the absence of identification skills. Identification here is intended by recognizing plants. [Bar-on et al., \(2018\)](#) mention that plants tend to be underrepresented in biology curricula, even though they are indispensable for all life on earth.

A more efficient biology lesson can be provided if the reading text includes plants and animals with the same capacity of meaning, the number of species represented increases, and species names are repeated more often ([Ahi et al., 2018](#)). Concrete thinking in students can be instilled with biology learning techniques in which learning uses existing local potentials ([Nizaar & Haifaturrahmah, 2017](#)). Local wisdom located in the area around students can be utilized as a learning resource. Where local vegetables as a form of regional wisdom are useful as a learning facility for students as a way to prevent plant blindness ([Monica, 2019](#)). In addition to preventing plant blindness, using local potential, especially local vegetables, can be a conservation strategy. Incorporating local plants into learning materials and resources can be an extraordinary conservation technique ([Mumpuni et al., 2013](#)). Getting to know local

vegetables can be a way to preserve regional wealth. Preventing plant blindness, becoming a conservation strategy, and being a way to preserve regional floristic wealth are important values of making local vegetables as a source of learning biology in schools.

Conclusion

The results of research on plant blindness among secondary school students in Hulu Gurung sub-district showed that students still lack knowledge about plants, especially local vegetables. High school students with an age range between 15 and 18 years only scored 15%, while the value of junior high school students with an age range of 12 to 15 years was 4%. With this value, it can be concluded that the level of plant blindness among secondary school students in Hulu Gurung District is quite high. Not without reason, this can occur due to a lack of introduction related to local vegetables. People tend to ignore the existence of these vegetables, even though they themselves often utilize them for their daily needs. Actually, they have some general knowledge and some knowledge about plants without distinguishing the variety of species. They only know that vegetables are green and can be consumed without knowing the species of vegetables. This can be a reference so that, in the future, local vegetables can be better recognized amid the existence of imported vegetables. We should maintain the diversity of local vegetable plants through conservation strategies, one of which is avoiding plant blindness as early as possible. So that we will not think to ignore plants and consider animals more. The capacities of animals and plants should be equally recognized because the benefits of both for life on earth are numerous. It is not good if we only see one of them while both have their own benefits and roles in life.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

T. Putriani: analysis, writing original draft preparation. **A. Sunandar:** Methodology, review and editing. **M. Qurbaniah:** review and editing.

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