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Pests and diseases of horticultural crops in Tanjung Seteko Village Indralaya District, Ogan Ilir Regency, South Sumatra

Arsi Arsi[*)], Tika Rahmawati, Amirah Salsabila, Fuji Anugrah, Mira Andani, Fitri Ani, Rintan Sartika Rahmadhonna, Muhammad Arifudin
Departement of Plant Protection, Faculty of Agriculture, Universitas Sriwijaya, Indralaya 30662, South Sumatra, Indonesia
[*)]Email address: arsi@fp.unsri.ac.id

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ABSTRACT

Cultivation of horticultural crops is often faced with the problem of plant pests, namely pests and plant diseases which cause plant productivity to decrease. In controlling pests and diseases, farmers often use synthetic pesticides, but farmers use pesticides that do not comply with regulations. The research aimed to identify species of pests and diseases in horticultural crops and farmers' in Tanjung Seteko Village, Indralaya District, Ogan Ilir Regency, South Sumatra in controlling pests and diseases of horticultural crops. This research method used purposive sampling and direct observation in the field. The farmers who were interviewed were farmers who grew horticultural crops. The results of this research found that vegetation around plants influences the diversity of pests and diseases. There were 8 pest species found with the highest attack rate of 17.56%, namely *Diaphania indica* attacks and the lowest attack intensity was *Valanga* sp. 0.19%. There were 8 types of diseases found with the highest attack rate being 41.11% (*Cucumber mosaic virus*) and the lowest at 0.56% (fusarium wilt). Pest and disease control with the application of synthetic pesticides by farmers was in a good category. The scoring of farmer's respondent statements in Tanjung Seteko Village was obtained with a score range of 28-41. The scoring results show that farmer's behavior in using pesticides is in the good category.

Keywords: *Cucumber mosaic virus*, *Diaphania indica*, fusarium wilt, *Valanga* sp., vegetation

INTRODUCTION

Horticultural crops are one of the commodities that are widely cultivated by Indonesian farmers. When viewed in terms of yield, horticultural crops in Indonesia are still not optimal. This is caused by various factors, such as cultivation techniques, pests, diseases and weeds that can reduce crop production (Marbun et al., 2019). Based on the results of the data, vegetable production fell 20-25% of the norm (Wahyudi, 2018). For the intensity of the pest attack itself, the highest average pest attack was 17.56%, namely the *D. indica* attack and the lowest attack intensity was the *V. nigricornis* pest attack, which was 0.19% (Tanaya et al., 2020). The level of disease attack intensity in the highest plantation was 41.11% (CMV) and the lowest was 0.56% (fusarium wilt). To overcome these problems, farmers use anti-pest drugs commonly referred to as pesticides. Pesticides are special substances that function to eradicate, prevent or eradicate insects, rodents, nematodes, fungi, weeds, viruses, bacteria, and microorganisms that are considered harmful pests (Sarvina, 2019). Overuse of pesticides can have negative impacts on the environment, crops and farmers. Several studies in the Indonesian region found high levels of pesticide residues in soil, water and even agricultural crops (Benu et al., 2020). Indonesian farmers are very familiar with the use of pesticides, but their use is still too weak.

Farmers in Tanjung Seteko Village have implemented the use of pesticides. However farmers still choose to use synthetic pesticides. With the many negative impacts caused by

synthetic pesticides, an innovation was found using vegetable pesticides (Sulainsyah et al., 2019). These vegetable pesticides are made from plant materials such as papaya leaves, soursop leaves, garlic, ginger, and others (I et al., 2022). The use of environmentally friendly vegetable pesticides can be an alternative solution for farmers. The purpose of this research was to inventory pests and diseases in horticultural crops and farmers' in Tanjung Seteko Village, Indralaya District, Ogan Ilir Regency, South Sumatra in controlling pests and diseases of horticultural crops.

MATERIALS AND METHODS

This research was conducted in Tanjung Seteko Village, Indralaya District, Ogan Ilir Regency, South Sumatra Province. The research took place from May to July 2022. The method used in this research was a survey method and direct observation in the field with a purposive sampling technique. Purposive sampling was a non-random sampling method where researchers collect illustrations through this method in determining the identity that matches the research objectives. There were two important things in using the purposive sampling method, namely non-random sampling and determining special characteristics in research results (Lenaini, 2021).

The first step taken in this research was to search and find horticultural plantations and then conduct sampling withthe interval method, namely observing 7 plants on horticultural plantations. The data obtained in the form of primary data obtained through interviews with 15 horticultural farmers on their habits in using pesticides.

Determination of Observation Location

Determination of the research location was done by direct observation in the field by determining fifteen horticultural crop fields in Tanjung Seteko Village, Indralaya District, Ogan Ilir Regency, South Sumatra Province. After obtaining land in Tanjung Seteko Village in Indralaya District. Fifteen fields were taken with fifteen farmers as respondents. The criteria for farmers who were designated as respondents in this field practice were horticultural farmers who use pesticides in controlling cultivated plants.

Survey

Interviews were conducted by conducting question and answers session with farmers who cultivate horticultural crops at the observation location. Questions asked included personal data, land characteristics, farmer behavior towards pesticide use and its impact on farmers, pests and diseases in plants. Documentation was carried out in this field practice to photograph the symptoms of pest and disease attacks as real evidence obtained in the field. Documentation was carried out using a mobile phone camera with objects in the form of conducting interviews with farmers, pests and diseases in plants and symptoms of pest and disease attacks. The documentation obtained was used to strengthen the results and discussion in the form of data that had been obtained.

Data Analysis

The data analysis of the results of observations in this field practice will be presented in the form of figures and tables. The observation variable in this field practice was the intensity of pest and disease attacks on the land. The calculation of attack intensity (%) was done by observing the sample and then calculating the number of attacks by using the attack percentage formula based on the formula. The calculation of disease incidence was done by calculating the intensity of the disease on the plant. The percentage of disease incidence was calculated based on (Supriatna et al., 2017) as followed:

$$PS(\%) = \frac{Nh}{Nt} \times 100$$

Description =
PS: Percentage of Attack (%)
Nh : Number of diseased plants/parts of plants or shoots
Nt : Number of plants/parts of plants observed

Parameters of farmers' behavior in using pesticides were calculated according to the questions contained in the questionnaire. There was a score for each farmer's answer, which was then calculated and grouped according to the existing score value. The data that had been obtained will be analyzed descriptively and presented in tabular form (Table 1).

Table 1. Scale score of farmers' behaviour in the use of pesticides

Score	Description
0-13	Very Low
14-27	Low
28-41	Good
42-52	Very Good

RESULTS

The crops grown in Tanjung Seteko Village were generally horticultural crops. The most widely cultivated plants during the field survey were *Cucumis sativus*, *Cucumis melo* L., *Luffa acutangula*, *Momordica charantia* L., *Vigna unguiculata* and *Cucumis sativus*. Cucumber plants were widely cultivated for economic reasons and the harvest time of this plant was relatively short (Figure 1).

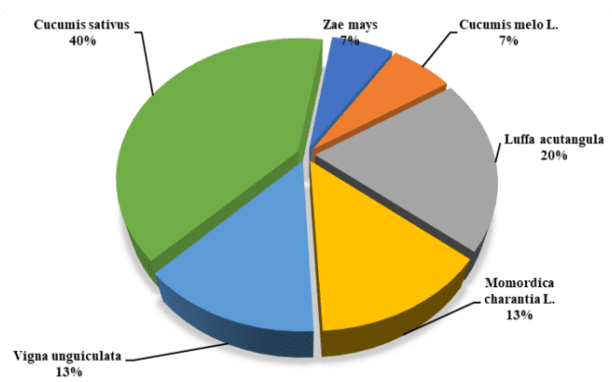

Figure 1. Types of horticultural crops in Tanjung Seteko Village, Indralaya District, Ogan Ilir District

Age could affect a person's activities, as well as farming activities. Someone with a productive age could do a lot of activities. In Tanjung Seteko Village, farmers with the highest age of 40-50 years were found, 43%, followed by 30–40 years, 29%, 20-30 years and >60 years, 14% (Figure 2).

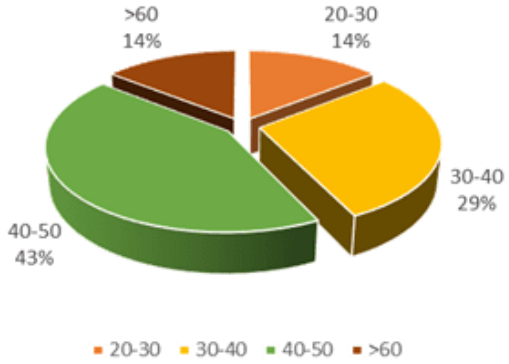

Figure 2. Age of horticultural crop farmers in Tanjung Seteko Village, Indralaya District, Ogan Ilir District

Education affects the mindset and knowledge of farmers in conducting plant cultivation. Education greatly affects the level of acceptance of farmers to new things or openness of farmers about new innovations. Farmer education will affect how farmers plan to achieve the production targets of cultivated plants. Farmers with a good educational background will encourage the creation of smart agriculture and will create an agriculture that was full of careful planning. In Tanjung Seteko Village, the highest percentage of farmers' education levels were those with primary school education (PSE) (80%), followed by junior high school (JHS) (20%), high school (HS) (0%) and bachelor's degree (BSD) (0%) (Figure 3).

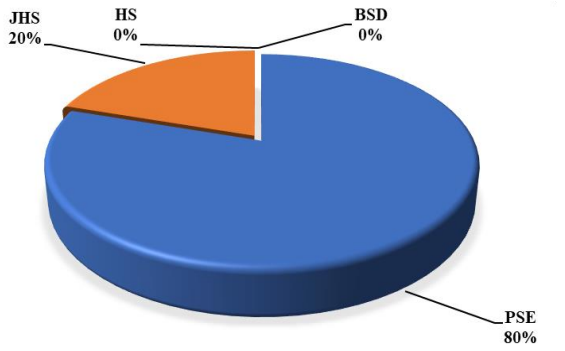

Figure 3. Education level of farmers in Tanjung Seteko Village, Indralaya District, Ogan Ilir District

The results of production obtained by farmers could be influenced by the area of land cultivated by farmers. Large land could produce more production and also a lot of cultivation costs, and vice versa narrow land cultivation costs and the results obtained were also less. The size of the land also affects farmers in monitoring the land. In Tanjung Seteko Village, of the 15 farmers interviewed, the most common land area cultivated by farmers was 0.25 ha at 44%, followed by 0.25-0.5 ha at 37%, 0.5-1 ha at 13% and >1 ha at 6% (Figure 4).

Plant cultivation carried out by farmers was certainly expected to produce satisfactory production results, therefore plant cultivation techniques were very important to note. Plant cultivation itself starts from seed selection, land preparation, plant maintenance protection against pests and of course plant nutrition until the plant

was ready to harvest. the results of interviews with 15 farmers in Tanjung Seteko Village found that in conducting plant cultivation, farmers generally use seeds purchased at agricultural stores, without conducting seed treatment, planting time was generally done as desired and the selection of planting time was done without any reason.

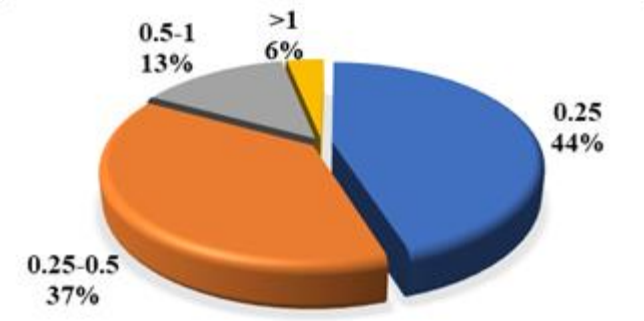

Figure 4. Land area cultivated by farmers in Tanjung Seteko Village, Indralaya District, Ogan Ilir District

Plant maintenance during its lifetime was carried out by farmers so that plants grow healthy and fertile. One of the plant maintenance includes protection against pest attacks. In practice, farmers in dealing with these problems usually rely on synthetic pesticides. The use of pesticides by farmers was very important to note because the wrong application of pesticides could cause many other problems, especially to the environment and health. From the results of interviews about the use of pesticides found that farmers in choosing the type of pesticide based on cases that occur in the field. OPT monitoring was done routinely, knowledge of pests and diseases farmers know from experience and farmers do not know the economic threshold of HPT. Interviews with farmers on how they apply pesticides found that in the application, farmers mostly read the pesticide packaging label in determining the concentration and dosage of pesticides used. In its application, generally farmers in Tanjung Seteko Village do it themselves with tools generally using tools following the formulation. The frequency of pesticide use by farmers depends on the condition of pests and plant diseases in the field (Table 2). Based on observations made in 15 horticultural plantations in Tanjung Seteko Village, 4 orders of insect pests were found with 8 species attacking insects from the Coleoptera, Diptera, Lepidoptera and Orthoptera orders (Figure 5). The highest insect pest attack on the species was *Diaphania indica* at 17.56%, while the lowest insect pest attack on the species was *Spodoptera litura* at 0.37%. The level of insect pest attack varies in each species, which could be influenced by species and plant age (Table 3).

Observations of 15 horticultural plantations in Tanjung Seteko Village, found that 8 types of diseases attack farmers' land. The plant diseases encountered included powdery mildew, feather dew, fusarium wilt, yellow virus, mosaic virus, anthracnose, leaf rust and leaf spot (Figure 6). Based on field observations, 9 disease species were found attacking the cultivated plants. CMV disease is the disease species that had the highest percentage of attacking plants at 41.11%, while the lowest disease attack in Fusarium wilt disease was 0.56% (Table 4).

Table 2. Score of pesticide use and types of pests in horticultural crops in Tanjung Seteko Village, Indralaya District

Farmer initial name	Pesticide score	Average	Description
AG	40	3.08	Good
MN	38	2.92	Good
LI	39	3.00	Good
HM	38	2.92	Good
SP	35	2.69	Good
WA	40	3.08	Good
HM	35	2.69	Good
JS	33	2.54	Good
PR	37	2.85	Good
WG	41	3.15	Good
TS	40	3.08	Good
SD	35	2.69	Good
SK	38	2.92	Good
YN	41	3.15	Good
BM	36	2.77	Good

Table 3. Percentage of pest attacks on 15 horticultural crop fields in Tanjung Seteko Village, Indralaya District

Ordo	Famili	Species	Percentage (%)
Coleoptera	Coccinellidae	*Epilachna* sp	0.74
	Chrysomelidae	*Aulacophora* sp.	9.44
Diptera	Tephritidae	*Bactrocera* spp	3.33
	Agromyzidae	*Liriomyza* sp.	4.63
Lepidoptera	Noctuidae	*Spodoptera frugiperda*	3.15
		Spodoptera litura	0.37
	Crambidae	*Diaphania indica*	17.56
Orthoptera	Acrididae	*Valanga nigricornis*	0.19

Table 4. Percentage of disease attack on 15 horticultural crop fields in Tanjung Seteko Village, Indralaya District

Type of Disease	Percentage of attack (%)
Feather dew	24.72
Powdery mildew	5.93
Fusarium wilt	0.56
BCMV	6.48
CMV	41.11
Anthracnose	6.48
Leaf rust	3.15
Leaf spot	8.52

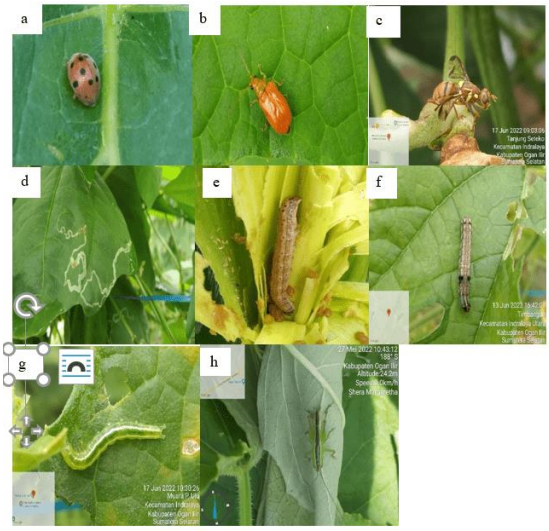

Figure 5. Pests encountered in the field *Epilachna* sp (a), *Aulacophora* sp. (b), *Bactrocera* spp (c), *Liriomyza* sp.(d), *Spodoptera frugiperda* (e), *Spodoptera litura* (f), *Diaphania indica* (g), *Valanga nigricornis* (h).

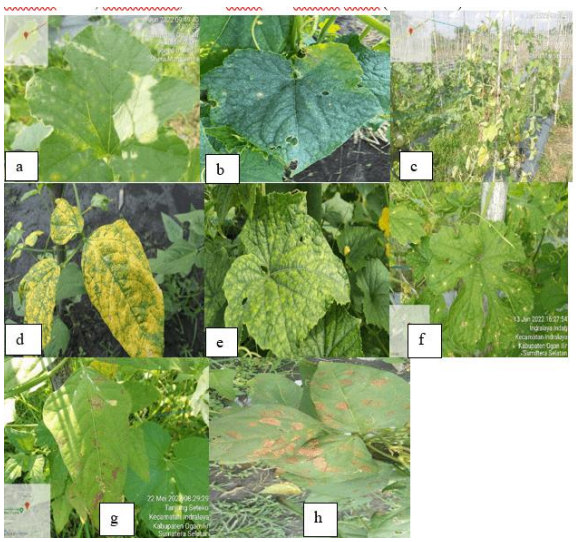

Figure 6. Disease symptoms observed in the field: feather dew disease (a), powdery mildew disease (b), fusarium wilt disease (c), BCMV (Bean Common Mosaic Virus) (d), CMV (Cucumber mosaic virus) (e), anthracnose (f), leaf rust (g), leaf spot (h).

DISCUSSION

Farming activities cannot be separated from the maintenance of plants from pests, these pests can be pests or plant diseases. In practice, farmers use pesticides to protect plants from pests, various brands and formulations of pesticides are found in the market (Suparman et al., 2023; Arsi et al., 2022). To see how the behaviour of farmers in the use of pesticides on plants, interviews and observations of HPT on 15 horticultural farmers in Tanjung Seteko Village, Indralaya District, Ogan Ilir South Sumatra. The horticultural crops encountered include cucumber, bitter melon, melon, long bean, and corn (Suparman et al., 2023).

Indonesian farmers' education is low, which affects their acceptance of new innovations and technologies. So they still cling to principles based on experience. According to (Hertanto et al., 2019) farmer education affects their perception of new technology, the higher the education, the broader their insight and openness to new things. Farmers' education also affects farmers' competition in carrying out agricultural activities (Manyamsari, 2014). The competition referred to here is how the embodiment of farmer behavior with its planning for the achievement of targets. Farmers with low education will make their knowledge level also low so that they are less competent in carrying out their work. Competence here refers to the skills of farmers in planning and carrying out their work with following the standards applied. Competent farmers produce quality production or as expected. Farmers who are active in agricultural activities are generally elderly, and their endurance in carrying out many activities has decreased. Age affects the ability of the number of activities that can be done, the older the age, the more limited the movements that can be done. Age affects the acceptance of new things (Rismayadi, 2016), young farmers will find it easy to understand to new things especially to new technology while elderly farmers will be fanatical about tradition so that it is difficult to change the way of thinking, the way of working and apathy to new technology. Farmers who are generally elderly will always apply what has been experienced, so in crop cultivation, it will be difficult to believe they apply new innovations.

The occurrence of pest attacks on crops in the field is found due to several factors, including land characteristics. Land characteristics which are environmental factors will greatly determine the life cycle of pests and plant diseases. This environmental influence includes the vegetation around the plants. In Tanjung Seteko Village, the vegetation around plants is planted diversely, vegetation around plants can be a supporting and inhibiting factor for pests and diseases. According to (Basna et al., 2017). Vegetation factors can affect the provision of habitat for insects. Plants around cultivated plants can be an alternative habitat for insect pests as well as predatory insects and parasitoids and also alternative hosts for some pathogens. This is in accordance with the opinion (Soesanto et al., 2021), that plants around agricultural land can also be vectors of disease transmission, for example weeds, weeds can interfere with or harm human interests, especially in the process of plant growth. Weeds are one of the main factors that can cause a decrease in agricultural yields (Tulak et al., 2023).

Before planting a crop, the first thing to consider is seed selection. Seed selection affects the quality of the crop. Seeds are selected by choosing superior seeds that have been certified by the Ministry of Agriculture (Nazimah et al., 2022). Farmers in Tanjung Seteko Village use seeds purchased from agricultural stores that are certainly certified. Quality seeds are very important in the successful production of a crop. This is with following the statement (Oka et al., 2016) that seed quality is one of the success factors of crop production. Seed selection is very important because plant diseases can be caused by seeds. Next is seed treatment, seed treatment is needed to prevent seed-borne diseases, but farmers in Tanjung Seteko Village generally do not carry out seed treatment. Knowledge of seed treatment to and minimize seed-borne diseases is also not widely known by farmers. For planting time, farmers do not have a specific reason for planting time in cultivating plants, in other words, they cultivate plants as they wish. This causes Tanjung Seteko Village to have a variety of crop commodities every season.

Pest attacks (plant-disrupting organisms) in crop fields are very detrimental to farmers if not handled properly (Syarifuddin & Hilda, 2023). Integrated pest control is one of the conceptions of environmentally friendly pest control, which seeks to encourage the role of natural enemies and is a non-chemical control method (Alzarliani et al., 2020). Before controlling using pesticides, farmers first make observations of cultivated plants or often called monitoring. Monitoring is an activity that aims to monitor or observe something. In monitoring an activity to be monitored manually, it must still be monitored directly (Aditya et al., 2021). Farmers carry out monitoring of pests regularly, this is one of the preventive measures so that there are no severe pest attacks on plants. Monitoring of plant pests and diseases is carried out regularly to prevent more adverse impacts, the results of monitoring pests and diseases can be used as an evaluation and used as the selection of the next right step (Muliasari, 2020).

In the application of pesticides the importance of wise action by farmers. The use of pesticides by farmers by looking at the dose and concentration based on the label on the packaging is a good action because farmers apply pesticides safely, effectively and wisely, and also the frequency of spraying is not too frequent spraying according to the condition of HPT on the land. One of the wise uses of pesticides is that farmers in its application pay attention to the packaging label and understand the dosage, concentration and rules stated on the label (Aridhayandi & Naufal, 2021). The use of good pesticides can eliminate pest plants, fungi, insects, and other organisms so as to increase agricultural production, especially in horticultural commodities (Rahmasari & Musfirah, 2020). The results of interviews with farmers all questions with farmers' answers are given a score which is then calculated and grouped according to the value of the existing score, the score range of farmers' behavior in the use of pesticides is 28-41 which is based on the score of farmers' behavior in using pesticides is good. The types of pests and diseases that are most commonly found in the field are 3 types. For the intensity of the pest attack itself, the highest average pest attack is 17.56%, namely the attack of D. indica and the lowest attack intensity is the attack of V. nigricornis, which is 0.19%. The intensity of pest attack in Tanjung Seteko Village is still in the safe category or still below the economic threshold. According to (Handoko et al., 2017). The intensity of attack was <40% light, 40-60 moderate, and > 60% heavy. For the intensity of disease attack in the highest plantation was 41.11% (CMV) and the lowest was 0.56% (fusarium wilt). The disease attack in Tanjung Seteko Village is still in the moderate category. Pest and disease attacks on horticultural crops in Tanjung Seteko Village are still within reasonable limits. Pest and disease attacks in the field one of which is influenced by how the behavior of farmers in controlling it. The most common control done by farmers is using synthetic pesticides. The use of synthetic pesticides is certainly very practical and provides many quick and effective reactions in its use (Pohan, 2014). Based on the results of interviews and scores of farmers in the use of pesticides, farmers in Tanjung Seteko Village are included in the good category. Conversely, the use of pesticides that are not appropriate and appropriate can pollute the environment, recurrence and resistance of pests and endanger the health of both farmers and consumers of agricultural products.

CONCLUSION

The pests found were 8 species belonging to 4 orders, namely insects from the Coleoptera, Diptera, Lepidoptera and Orthopthera orders. The highest intensity of insect pest attack was D.indica 17.56% and the lowest intensity of pest attack was *V.nigricornis* 0.19%. There were 8 types of diseases found, namely feather dew, powdery mildew, fusarium wilt, BCMV, CMV, leaf rust and leaf spot. The highest disease attack intensity was mosaic virus 41.11% and the lowest disease attack intensity was fusarium wilt 0.56%. Pest infestation in the crop was categorized as low and disease infestation was categorized as moderate. The behavior of farmers in Tanjung Seteko Village with a score range of 28–41, the scoring results show that the behavior of farmers in the use of pesticides is in a good category.

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