

Arrowhead Vine (*Syngonium podophyllum*) and Mexican Turnip (*Pachyrhizus erosus*) in Ilocano Indigenous and Non-Indigenous Communities

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Abstract— To the Ilocano people, hardship in life is never a hindrance to victory. They strive hard to make for a living. Challenges and trials can easily be overcome because they believe in the value of hard work; thus, every Ilocano finds ways to improve life for the better. Hence this study emerged. The investigation compared the effectiveness of Arrowhead vine (*Syngonium podophyllum*) and Mexican Turnip (*Pachyrhizus erosus*) against ants. It looked into both plant uses in the Ilocano Indigenous & non-Indigenous Communities. The study used the mixed qualitative and quantitative method of research. In the Experimental research design, there were ten trials for the four treatments and three replicates. Interviews were done to 27 residents of Ilocano Indigenous and non-Indigenous Communities on the uses of each of the plant, a total of 54 interviewees. Results showed that Arrowhead vine and Mexican turnip alcohol leaf extracts when compared with aqueous leaf extracts have significant differences between and among all pairs. Mexican turnip is more effective than the arrowhead vine as an insecticide against ants. Both the plants have folkloric uses in the Indigenous and non-Indigenous communities. These are medicinal and used for decorations. People cultivate and cook this edible *Pachyrhizus erosus* and sell while arrowhead vine is sold for interior decors and landscaping to augment their daily living. Ilocanos should continue to discover the other uses of the plants to improve their way of life and maintain their identity as Ilocanos working together for a common goal.

Keywords: medicinal, decorations, ethnographic method, lumpianada, leaf extract insecticides

INTRODUCTION

ILOCANO people make up the third biggest ethnolinguistic group in the country. Huge populations are located in Tarlac, Pangasinan, La Union, Ilocos Sur, Ilocos Norte, Abra, Nueva Vizcaya, Cagayan, and Benguet. Many Ilocanos can be found even in the different parts of the world like Asia, Europe, United States, most especially in Hawaii and in the United Kingdom. The Ilocos Region is not endowed with large tracts of land for farming compared to other regions. To survive, Ilocanos have maximized the use of the small space available to them by planting diligently. Their geographic disadvantage has made Ilocanos innately cautious, very resourceful, practical, and frugal.

Almost 1,600,000 persevering Ilocano people dwell in the different provinces of Ilocos Norte, Ilocos Sur, Abra, Benguet, La Union and in the northwestern coast of Luzon. Only a little portion of the land is fertile and arable. Rice is considered the main crop. Due to the insufficiency of fertile land area in agriculture, foodstuffs are most often not enough for them. Its physical environment had affected the way of life of the people. They are used to hardships in life and are thrifty. Work to them is too important to earn a living; thus to an Ilocano, each centavo counts. In Ilocos province its economy depends in agriculture but it is not that profitable compared to other provinces. Therefore, the Ilocano families engage in other lucrative business or occupation to augment their income. Some of the people dye and spin yarns. They weave clothes, jackets, blankets, towels, bags, napkins and table cloths. Vinegar wine, bagoong and tuba making are other Ilocano industries aside from weaving (Living in the Philippines, 2017).

The Ilocanos are said to be dedicated to their work, patient and adventurous. They go to nearby different provinces like Pangasinan, Tarlac Nueva Ecija, Aurora, Nueva Vizcaya

and Cagayan during harvest time, to find new jobs. After they have earned, they return home. Many also go to far away places, like Bukidnon, Romblon, Samar, Cotabato, Davao and other parts of Visayas and Mindanao. Many Ilocanos are also staying and working in other countries like Saudi Arabia, Canada, USA, Japan, China, Malaysia, Indonesia and Singapore. They easily adapt themselves to their new environment. Many of them would research on something to improve life, hence this study was conducted.

The increasing insecticide usage to control different insects has hastened some concerns against dangerous outcomes of the chemical constituents on living organisms and their vicinity. Thus the researcher looked into an alternative process in controlling insects.

Years back, people were not interested in using organic insecticides maybe because they do not have time to prepare or are unaware of the effects of synthetic insecticides. Nevertheless, gradual interest has grown noticeably to the public. As years passed by, many had realized and joined the organic movement to go against those throwing chemicals in the sea, river, lakes and the soil, heavy pollutants in the air, additives in food, and the dangerous insecticides/pesticides religiously sprayed. The nature's balance has been unpredictably affected as the number of good and necessary bugs has been diminished, and to make things worse, many of the dangerous insects have developed resistance to pesticides. However, numerous researchers found several plants that produce botanical insecticides, bactericides, fungicides, and pesticides. In fact, many nontoxic household products are considered effective in the eradication against gardening pests.

History also reveals that overzealous plant insecticides have advantages of a wide range of sources, easily made with

local materials, low-cost, useful and safe for people, animals, and crops, etc. The compound of botanical insecticide is an alternative way to improve the effectiveness of such pesticides. With the development of green agriculture, it will gain more and more attention (Shi Wei Wu et al., 2016).

Mexican turnip leaves are considered agricultural wastes after harvesting the roots for many would throw away these parts, this is the reason why the researcher would like to utilize the unused /waste parts of the plant for insecticidal purposes. Likewise, the arrowhead vine plant is easily cultivated, and in just a short time one can cultivate this climbing plant as many as he could. With this, the researcher would like to help solve environmental problems in the community by utilizing these plants that could be easily located. With great hope, this research will be one of the numerous investigations on the use of local plants as insecticides that will lead to the replacement of synthetic and petroleum based insecticides that ruin the earth. This will tremendously result to reduction of environmental pollution, lessen the dependence and expenditures and imported insecticides. Making one's own pesticides does have the advantage of paying less while getting the best. It is risk -free, by knowing the ingredients of a homemade insecticidal solution, one is making sure that it is not harmful to him and his family members. Insecticidal plants can serve as one of the tools for pest management. Hence this study is relevant at this time.

Summer is the Mexican turnip season, this is a perfect time to eat this to refresh oneself. This is a type of a root crop vegetable that gives very low calories. It can be a substitute snack for persons who want to reduce weight but have no time for exercise or who do not like to engage in strenuous exercise. Thus, it became a well known alternative diet practice for the modern generation of body and health conscious people.

Similar to other fruits and vegetables, it is popular for its nutritious fiber. Admittedly, it can fully satisfy hunger even if it is light in the belly. The aforementioned plant contributes in the decrease of diabetes, obesity and hypertension risks.

Mexican turnip also has water contents which then gives off a cooling effect. Almost 75 percent of the human body consists of water, therefore eating Mexican turnip may also serve as a supplement or replacement to persons undergoing water therapy. The liquid from this helps in cleaning the body, further it aids the different organs to work well like integumentary, stomach, pancreas and kidney.

Aside from being a low calorie food, Mexican turnip is also a source of minerals, vitamins and anti-oxidants. It is known to be Vitamin C source which contributes for the increase of collagen. It also prevents illnesses and hasten curing of a broad range of health issues due to its nutritious content. The Mexican turnip minerals and nutrients which are significant for the over all well being of the human body are phosphorous, calcium, magnesium, folic acid, niacin, iron, sodium and

potassium. Due to the beneficial effects of Mexican turnip, people around the globe have discovered various ways to cook it. In some parts of the Philippine Islands, Mexican turnips are best ingredients for "Lumpiang Sariwa". Cooking the plant could ruin many of the natural minerals, vitamins and nutrients. Thus, the most acceptable way to eat Mexican turnip and enjoy the positive benefits is through the former style in cutting the vegetable into small pieces and submerge into vinegar and a pinch of salt. (Healthy Living Guide, 2012).

OBJECTIVES OF THE STUDY

This study tried to compare the *Syngonium podophyllum* and *Pachyrrhizus erosus* leaf extract insecticides against *Tapinoma sessile*.

It also looked into how the Ilocano indigenous and non-indigenous communities utilize the arrowhead vine and Mexican turnip in their way of life.

Framework

The arrowhead vine is native to South America. This plant species has various cultivars with varied amounts of variegation, from almost pure green to nearly white foliage. A stimulating growth pattern of the leaves is, they begin to be cordate (heart) shaped then develop into arrow and further become palmate (same shape to a hand). When the plant matures into a climbing vine it needs to be cut back to prevent growth becoming wild and hard to manage (Houseplant experts 2016). It is an ordinary heart shaped and stunning very useful ornamental species. It is cheap to buy and easy to propagate (Kumar et al., 2015).



Figure 1. Arrowhead Vine

Pachyrrhizus erosus Linn. belongs to the pea family which is a climbing plant located in Central America. It has been cultivated for its edible tubers during the pre-Columbian times. Other names are: Mexican turnip, Mexican potato, Mexican yam and jicama. Many times eaten fresh but could also be cooked with varieties of dishes. Mexican turnip originated from Mexico then brought to the Philippine Island. It was brought to China and other areas of Southeast Asia, where well known uses of the raw plant include fresh "lumpia" in the Philippines and salads in Brunei, Singapore and Malaysia such as Rojak and Yusheng. A decoction of Mexican turnip roots is used as a diuretic remedy. A warmed rug poultice of the pulp could be used to heal painful areas on the leg. The oil of the seeds are purgative. Tincture from these can cure herpes, and the roots are used to heal hemorrhages and head-

aches (Healing Wonders of Philippine Medicinal Plants, 2015).



Figure 2. Mexican Turnip

Stinking House Ants (*Tapinoma sessile*)

House ants can be found in the entire USA, Canada and Mexico. They feed on varied items including those found in homes but prefer to feed on food high in sugar.

These mentioned ants can develop extremely large colonies but tend to maintain only several thousand workers with numerous queens. Winged reproductives can be seen from May to July. Workers are very active and move rapidly in single files. They prefer greasy and sweet foods and dead organisms too. Their nests are located typically outside under boards, rocks, and the like. Colonies are from hundreds to many thousands of individuals in size. Stinking house ants nest indoors near sources of moisture and warmth, in voids, but also in termite-damaged trees/woods. Their ability to feed on several kinds of food brings them into conflict with people when they contaminate stored products. They cause problems. They are significant pests to homes and buildings and indirectly cause crop and other plant damage. (Penn State College of Agricultural Sciences, 2016). This type of ant can also be found in Asia especially in the Philippine homes. They eat most household foods, especially sugary food, example sweets and fruits such as melon. They also eat pet food. They are attracted to moisture. In hot and dry environments, nests can be found in house plants and even lids of toilets. They produce a coconut smell when crushed.

Kumar et al. (2015) in their study on Preliminary Evaluation of Biological Activities and Phytochemistry of *Syngonium podophyllum* Leaf reported the profiling of phytochemical analysis, antioxidant, antimicrobial, and anticancer activities of *Syngonium podophyllum* leaf ethyl acetate extract. The researchers extracted the leaf samples using the ethyl acetate with the aid of the Soxhlet apparatus. Phytochemical analysis revealed the presence of terpenoids, flavonoids, alkaloids, saponins and sugar.

Abhilash and Singh (2009) in their study on an Indian Pesticidal Usage mentioned that agriculture continues to remain the most important objective of Indian planning and policy. In the methods of development in agriculture, pesticides have become an important tool as a plant protection agent for boosting food production. Further, pesticides play a huge role

by keeping varied dreadful diseases. However, exposure of individuals to pesticides both environmentally and occupationally causes a range of human health problems. It has been observed that the insecticidal exposures are increasingly linked to immune suppression, hormone disruption, reduced intelligence, reproductive abnormalities, and cancer.

Currently, India is the highest producer of insecticides in Asia and ranked 12 worldwide for the usage of insecticides. A great number of Indians are engaged in agriculture and are therefore exposed to the pesticides used in agriculture. Although average Indian consumption of pesticide is very much lower than many other developing countries, the pesticide residue problem in India is very high. It had affected many crops and had affected the export of agriculture commodities in the last years. In this context, pesticide safety, regulation of its use, proper application technologies, and integrated pest management are some of the main strategies to minimize human exposure to pesticides. There is a dearth of related researches to these issues in India. Consequently, the thrust of this manuscript was to review the technology part of pesticidal application in India and recommend future methods for the use of pesticides and minimize problems related to environment and health.

Qahtani et al. (2012) in their study on biochemical and pesticidal effects of selected plant species against *Oryzaephilus surinamensis* tested dry powders of three plants namely ginger (*Zingiber officinale*), hail (*Elettaria cardamomum*) and shammar (*Foeniculum vulgare*) for their toxicity, against the adult beetle as pests threaten the date product in Saudi Arabia. All the tested species exhibited insecticidal activity against *O. surinamensis*.

El-Sayed et al. (2013) in their study on evaluation of antioxidant and insecticidal effects of different ginger extracts determined the antioxidant and insecticidal effects of three ginger extracts (water, ethanol, and acetone). It employed different assay system. The total amount of phenolic compounds in each extract was determined as gallic acid equivalents, and total flavonoid contents were calculated as quercetin equivalents from a calibration curve. All extracts showed antioxidant activity in two methods used in this study.

Abara et al. (2015) studied on pesticidal analysis of *Chromolaena odorata* against adult phase of *Periplaneta Americana*. Udebuani unveiled that the leaf extract was poisonous to the insect vector. This toxicity revealed some measures of anti-insecticidal activity on the test organism. This indicated that the extracts could serve as an alternative method of chemical control. They further mentioned that there is a dire need to study and establish against pest and disease problem of humankind.

METHODOLOGY

This study made use of mixed qualitative and quantitative method. Experimental research design in actual laboratory setup was done where variables were carefully controlled or ma-

nipulated and descriptive ethnographic methodology was used to find out the uses of the arrowhead vine and Mexican turnip in the Ilocano indigenous and non-indigenous communities in their way of life. Interview and web digging were done for part II.

Part I. Insecticidal Testing

The Experimental procedure was divided into three phases as follows:

A. Extraction with Dilution Process

Fresh arrowhead vine leaves were gathered in Santa Catalina, and Cabugao, Ilocos Sur and Mexican turnip leaves were gathered in Sto Domingo, Ilocos Sur. These were fully washed using mineral water in a basin and air dried for a week. They were air dried so that the moisture content or the water content be removed leaving only the insecticidal property. The leaves were crushed into small pieces. Ten grams of each of these samples were weighed and placed in a five hundred ml separate beakers, one hundred milliliters of water were added into the beakers. The beakers were covered with cellophane sealed with a rubber band so that the volatile substances will not escape. These were refrigerated and allowed to stand for three days. These were used as the crude aqueous leaf extracts and were stored in the refrigerator.

The above procedure was repeated in the preparation of the alcoholic leaf extracts, but instead of water methyl alcohol was used as the solvent and extracting media.

In removing the methyl alcohol, a water bath apparatus was used to boil the methyl alcohol in the leaf extract. The boiling point of the aforementioned alcohol which is 64.7 °C was maintained when heating so as to leave only the crude extracts and methyl alcohol escaped from the extracts.



Figure 3. Extraction Process

B. Collection of Test Animals

One hundred eighty matured *Tapinoma sessile* of equal sizes were gathered from their hidden places in Manangat, Caoayan, Ilocos Sur where the researcher lives. The test organisms were placed in their containers.

C. Spraying

Before the distribution of ants in their allotted containers,

clean white tissue was placed at the bottom of the petri dishes to absorb the excess plant and commercial pesticides and to avoid drowning of the test organisms. The sample insects were sprayed two times at the same time. There were four treatments, ten trials and three replicates. The four treatments were the following done separately for two plants : alcohol extracts of Arrowhead vine leaf and Mexican turnip , aqueous extract of both plants, water (negative control) and “wangwang” insecticide(commercial insecticide) which was used as the positive control. Spraying of the insects was done at a distance of one foot away from the mouth of the containers. The researcher used a stopwatch to look into the exact time of the ants’ death. The arrowhead vine and Mexican turnip alcoholic & aqueous leaf insecticides were then compared with the positive and negative controls to determine the insecticidal efficacy of the plant. The ants were observed keenly. There were ten trials for each of the treatment and three replicates for each trial hence a total of 180 ants were observed.



Figure 4. Insecticidal Testing

Statistical Treatment

The researcher used the Mean and Standard Deviation for the measured time of death of insects and to determine the significant differences in the efficacy of the insecticides, the researcher used the Analysis of Variance (ANOVA).

Part II. Interview

Sources of Data

Respondents on the uses of Arrowhead Vine were plant growers and vendors , three each from the different municipalities of Ilocos Sur: Suyo, Cervantes, Salcedo, Tagudin , Burgos ,Caoayan, Bantay, Sta Catalina and Sto Domingo from ages 35 and above.

Respondents on the uses of Mexican Turnip

Respondents on the uses of Mexican Turnip were the 27 “Panglakayen” ages 57 and above of the selected municipalities of Ilocos Sur like Suyo, Cervantes, Salcedo, Tagudin, Burgos ,Caoayan, Bantay, Sta Catalina and Sto Domingo , Ilocos Sur. It was noted that there were no growers of Mexican turnip in Cervantes and Suyo.

Data Gathering Procedure. Letters were given to the respondents and time for the interview was set. The interview

was done for thirty minutes. The interviewees' contact numbers were asked by the researcher for further questions needed.

Ethical Considerations

The following principles of ethical considerations have been complied by the researcher as a result of analyzing the ethical guidelines of social science research:

The respondents in the research were not subjected to harm in any way whatsoever. Respect for the dignity of research participants was prioritized. The researcher obtained full consent from the interviewees before the study was conducted. The protection of the privacy of research participants was ensured. An adequate level of confidentiality of the research data was observed. The anonymity of individuals was maintained, and any type of communication about the research was done with honesty and transparency (Bryman and Bell (2007).

RESULTS AND DISCUSSION

I. Experimental Part

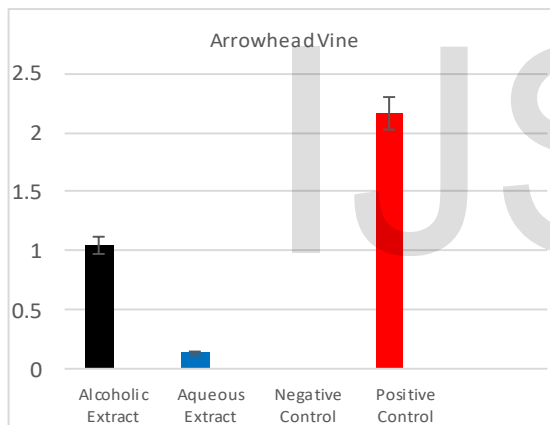
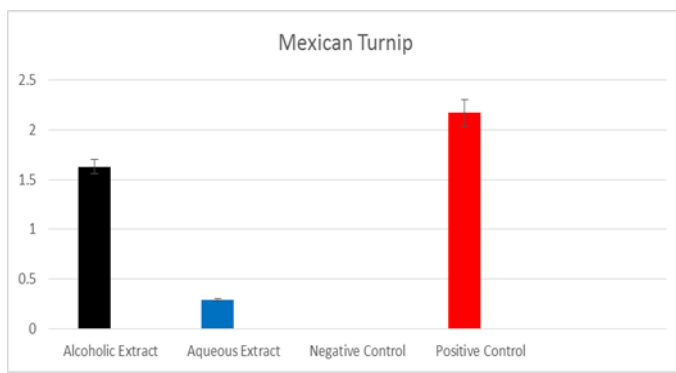


Figure 5. Mortality Rate (ants/minute) Using Arrowhead Extracts, Negative and Positive Control

It could be seen in the graph that the arrowhead vine alcoholic extract when sprayed to the ants, a mean mortality rate of 1.03 ant/min. was observed while the aqueous extract, when sprayed to the ants, 0.124 ant/min. mean rate of mortality was seen. Using the positive control 2.17 ant/min. mean mortality was observed. On the other hand, using the negative control (water) when sprayed to the ants, none of the test animals died even after hours. This indicates that the arrow-



head vine extracts (alcoholic and aqueous leaf) are not comparable with the positive control but when compared to the negative control have insecticidal property.

Figure 6. Mortality Rate (ants/minute) Using Mexican turnip Extracts, Negative and Positive Control

It could be observed in the graph that the Mexican turnip alcohol extract when sprayed to the ants, a mean mortality rate of 1.63 ant/min. was observed while the aqueous extract when sprayed to the ants, 0.292 ant/min. mean mortality was seen too. Using the positive control, 2.17 mean mortality was observed. On the other hand, using the negative control (water) when sprayed to the ants, none of the test animals died even after hours. This indicates that the Mexican turnip extract has insecticidal property.

Table 2
Summary Table of Two-Way ANOVA
Tests of Between-Subject Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
plant	.722	1	.722	125.239	.000
treatment	61.640	3	20.547	3564.058	.000
Interaction effect between plant and treatment	1.171	3	.390	67.733	.000

There is a significant interaction effect between the treatments (aqueous and alcoholic extracts) and the kind of plant used. This suggests that the kind of plant used (arrowhead vine and Mexican turnip had significant interaction with the treatment when these two factors experimented with the insects (ants). This is an evidence that the type of treatment and the kind of plant used affected the mortality of the experimental insects.

Table 3
Pairwise Comparisons of Treatment Per Plant

Plant	(I) Treatment	(J) Treatment	Mean Difference (I-J)	Sig.
Arrowhead Vine	Alcoholic Extract	Aqueous Extract	.914*	.000
		Negative Control	1.038*	.000
		Positive Control	-1.130*	.000
	Aqueous Extract	Negative Control	.124*	.003
		Positive Control	-2.044*	.000
	Negative Control	Positive Control	-2.168*	.000
Mexican Turnip	Alcoholic Extract	Aqueous Extract	1.338*	.000
		Negative Control	1.630*	.000
		Positive Control	-.538*	.000
	Aqueous	Negative Control	.292*	.000

	Extract	Positive Control	-1.876*	.000
	Negative Control	Positive Control	-2.168*	.000

*. The mean difference is significant at 0.05 level.

It can be seen from table 2 that the mean mortality rate (ants/min) for both plants arrowhead vine and Mexican turnip are significantly different from one another. When compared to the negative and positive controls they show significant differences. This indicates that both plants are not comparable to the positive control but are better than the negative control in which none of the ants died. This implies that both the arrowhead vine and Mexican turnip have insecticidal properties.

Further statistical analysis was made comparing the arrowhead vine and Mexican turnip as seen below.

Table 4
Comparisons Between Arrowhead Vine and Mexican Turnip Per Extract

Treatment	(I) Plant	(J) Plant	Mean Difference (I-J)	Sig. ^a
Alcohol Extract	Arrowhead Vine	Mexican turnip	-.592*	.000
Aqueous Extract	Arrowhead Vine	Mexican Turnip	-.168*	.000

* The mean difference is significant at the .05 level.

Results show that Mexican turnip is more effective than arrowhead vine in both the treatments alcoholic and aqueous extracts, the mean difference is highly significant at 0.05 level. The alcoholic extract is more effective than the aqueous one. This could be due to the presence of organic chemical substances found in the experimental leaves which were soluble in alcohol but not in water.

Part II A. Interview on the Uses of the Arrowhead Vine

Some of the respondents said they use the arrowhead vine just for home decorations, and landscape purposes. There were a few who mentioned that they grind the leaves for medicines, applied to bruises and deep wounds. This confirmed a research on Antibacterial screening on Arrowhead Vine which revealed that there is an anti-inflammatory activity of the plant roots (Biodiversity Education and Research Greenhouses 2019).

There were also some who mentioned that they sell the plant in a minimal amount for interior home decorations/gardening.

Part In-view the of



II B. ter-on Uses Mex-

ican Turnips

Figure 7. Picture of an interviewee taken in Caoayan

All the respondents mentioned that the Mexican turnip fruit and seeds are cooked which are usually called "dineng-deng, baradibud, sinigang, and pinakbet" in their locality. They mentioned that Mexican turnip roots are usually eaten raw or pickled. They make salad out of these. They can be excellent menu during their parties, picnics, etc.

Roots are sold and are grouped together in smaller clusters called "sepal"; and "ridon " meaning grouping the sepal for marketing. Some used these for diet to help lose weight too.

Mexican turnip stems can be made into ropes too.

A respondent from Sta Catalina, Ilocos Sur mentioned that when they were young, the small rejected Mexican turnip roots were boiled and were eaten. The taste became sweeter and texture became smoother than the fresh ones which were served during their merienda time.

Two interviewees mentioned that Mexican turnip peelings are made into flour , an ingredient in bread.



Figure 8. Iluko Lumpiana-

da

According to the vendor interviewees, the Iluko Lumpianada especially those from Bantay, Ilocos Sur, cut the Mexican turnip into pieces and include in the recipe of lumpianada, they said it tastes good . They include in the recipe because it is cheaper than the other ingredients.

Figure 9. Fresh Lumpia

Fresh Lumpia

According to three interviewees, the Iluko fresh lumpia especially those from Bantay, Ilocos Sur, include Mexican turnip in the recipe of fresh lumpia, they said it tastes good. They include in the recipe because it is cheaper and nutritious than the other ingredients.

Medicinal use of Mexican turnip

Five of the respondents mentioned that decoction of roots are diuretic, fresh roots are used to treat fever and the seeds are laxative and purgative.

Sociocultural Uses of Mexican turnip

Mexican turnips are used during festivities. These are used as decorations during Semana Santa placed in booths as harvest for thanksgiving.

When there are contests during fiestas, Mexican turnip Challenge is played by young and adults. This tradition of the people bring them together for socialization and ways to improve their camaraderie.



Figure 10. Mexican Turnip Challenge

CONCLUSIONS

The arrowhead vine alcohol extract when sprayed to the ants, a mean mortality rate of 1.03 ant/min. was observed while the aqueous extract, when sprayed to the ants. 0.1240 ant/min. mean mortality was seen too. The Mexican turnip alcohol extract when sprayed to the ants, a mean mortality

rate of 1.63 ant/min was observed while the aqueous extract when sprayed to the ants 0.2920 mean mortality was seen too. Both the aqueous and alcoholic extracts of arrowhead vine and Mexican turnip are not comparable to the positive control, but both have insecticidal properties compared to the negative control, in which none of the insects died.

The alcoholic solution has a higher degree of insecticidal property, hence more effective than the aqueous leaf extract of both the plants. The Mexican turnip leaf extract is more effective than arrowhead vine as far as toxicity is concerned.

The Mexican turnip was used by the Ilocano people for food, medicine, marketing and used for reducing weight. The arrowhead vine plant is used for home decors, landscape, medicine and people sell this in a minimal amount to augment their income.

RECOMMENDATIONS

The arrowhead vine and Mexican turnip can be raw materials for the preparation of organic insecticides, particularly against ants. Further studies should be conducted using other concentrations of arrowhead vine and Mexican turnip against other insects like mosquitoes, flies, cockroaches, termites, etc. The heavier the weight of the insects, the longer should be its period of exposure to the insecticidal spray and the dosage should also be higher. A follow-up study should be conducted on insecticidal testing of other species of insects and other kinds of plants. Another study is recommended using different concentrations of leaf extracts from other plants be tested with other insects. A follow-up study should be conducted to determine the medicinal properties and other uses of the plants. Since there are many uses of the arrowhead vine and Mexican turnip in the Ilocano Indigenous and non-Indigenous communities, it is highly recommended that people should propagate these two species.

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