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Resinate Kit

(Tree resin made portable and convenient in a small informative/useful kit.)

This kit will explore the medicinal and practical uses of tree resin/sap. Through the ages ancient to present, people have used sap for medicinal and survival purposes; healing, cleansing, bonding, sealing, igniting, etc. The consensus among studies concludes that sap is an extremely versatile substance. Resinate, once tested and further studied, can be packaged with an instructional, so that its natural components can be available for anyone and every occasion.

Literature Review:

Despite primitive knowledge of medicine, people throughout history used resins and alternate substances to increase healing, and reduce the risk of infection in wounds (Forest). Natural antiseptic properties found in pine have been known to eradicate infection causing pathogens (“Health”)(Brutsch). Salve or oleoresin can contain essential oils, beeswax, turpentine, and pine resin to clean, protect, and treat wounds (Sharkey). During the process of treating a chronic wound biofilms can take part in the detriment of a wound healing. Microorganisms, found in biofilm, contribute to the importance of cleansing a wound to prevent infection (Dorai). Resin acids or acids that contain similar structures found in trees, contain

antimicrobial processes that inhibit various microorganisms, from bacteria to fungi. The action of obstructing microorganisms can be studied under electron microscopy (Savluchinske-Feio).

Going back into history, Egyptians discovered that wrapping a wound in resin/gum coated linen would bring the edges of a wound together, causing it to close and heal faster (Forest). Tree resin is a viscous material that has several adhesive and glue like uses. Resin itself can patch small holes and seal tears in fabric, but for larger holes and tears using another fabric to overlap and then seal with tree resin is more desirable (Walker). Pine pitch can waterproof, glue or patch most anything in the woods or on the go once it has dried (Walker). Through the process of making boats people in the past have used pine pitch for sealing holes and cracks in canoes (Erichsen-Brown).

Tree resin is highly flammable, most probable to the high quantity of turpentine found within it (Walker). In wet weather conditions, resin is the key to starting and keeping a fire going. Resin rich wood is the ultimate source of a great, heat producing flame. Once lit, depending on the size of the piece of resin, the flame lasts for an extended period of time (Walker).

Animals use sap too. Native Americans found that animals healed their wounds by rubbing against where the resin emitted from trees (Langenheim). Since resins do not rot, putting it on wounds was in the effort to prevent further infection (Forest). Coniferous tree resin is collected by wood ants to put in their nests. The existence of the resin helps them defend and sanitize their nests from fungal and bacterial pathogens (Brutsch). Sawfly Larvae use self produced oils similar to that of their habit in the pine, turpentine resin as a defense system when they are disturbed (Eisner).

Historically the uses of sap are endless. The common consensus among multiple ethnicities, societies, and animal species is that sap is healing. People have used sap for medicinal and survival purposes; healing, cleansing, bonding, sealing, igniting, etc. Once collected, tree resin/sap can be packaged with an instructional, so that its natural components can be available for anyone and every occasion, just as this review has stated. :)

Project Summary:

- a. My reasoning behind choosing this project was to prove that sap has many uses and can be packaged for people's use wherever they may be. This research is scientifically important in that we as humans may have the ability to use sap in situations and places we might not have been able to, without sap being readily available in a package for all to use. Research has shown that this project was possible as well as highly useful. The effects of the accessibility of sap are extraordinary to the surrounding people. Hikers, campers, and ordinary citizens all over will have sap to help them out of sticky situations, due to its multi purpose capabilities. The societal impact of my research after I finished it will make people realize that they can't live or leave without tree sap at hand.
- b. My hypothesis was that my results directly correlated with the research I have conducted. My research shows that sap has many useful purposes and when packaged it can be available for everyone's individual use. My engineering goal was to find out how I could create a small package of sap that could teach and apply to those who like to work with a useful tool. My expected outcome was to have a package consisting of premade sap ointment for wounds, and ground sap for multi purposed reasons (with instructions) such as cleansing, bonding, sealing, and igniting. This was based on the rationale above because of the usefulness of sap and the want for availability for others.
- c. Procedures:
 - First, I collected sap and distributed it into groups for ground resin compacts/ pyro testing and ointment.
 - Second, I made a sap compact for both a fire starter and an ointment with ingredient and use/application information.
 - Third, I tested the flammability of sap, and the sap ointment against bacteria in a petri dish and saw the bacteria count once I finished the experiment, to confirm the ointment actually works in both uses.

- Fourth, I created graphs to compare the longevity of the flammability of the ground compact resin, and the bacterial disinfectant content of the ointment.
- Fifth, Since the experiment worked I put the sap ointment into a container within the package system and organized data from the experiment.
- Sixth, I put supplies that accessorize the ground resin compact and ointment in with the package for proper functional use of the kit, such as; matches, oil, or instructions on how to properly and feasibly use the tree sap.
- Seventh, I packaged the sap ointment, the ground sap, and the supplies to further the uses of the ground sap into a small durable kit for the use of anyone.

Materials:

-Tree sap (frozen and crushed, then melted), beeswax, liquid coconut oil, jojoba oil, lavender essential oil, cooking pot, stove burners, strainer, harvesting knife, freezer, matches, lighters, petri dishes, bacteria, and a concrete floor (to crush the sap), plus whatever I might have forgotten.

Risk:

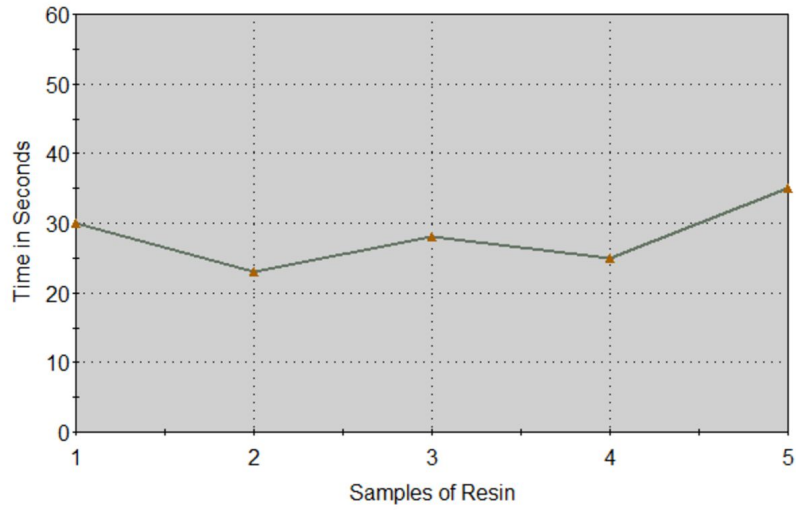
There was little to no risk involved in the making of this tree sap packaged product. I looked into what could hurt a tree when harvesting it's sap, so I didn't hurt the tree. I took safety precaution in how I used equipment such as cooking utilities and sap harvesting knives, so that I didn't harm myself. The risk of this packaged sap being harmful is extremely low. The safety of the users were put into account by testing the antibacterial properties of the sap ointment. There were no obvious dangers to humans involved in my project. Unless the user of the product has an allergic reaction or combines two different products together it may cause a chemical reaction, no other precautions are identified.

Data Analysis:

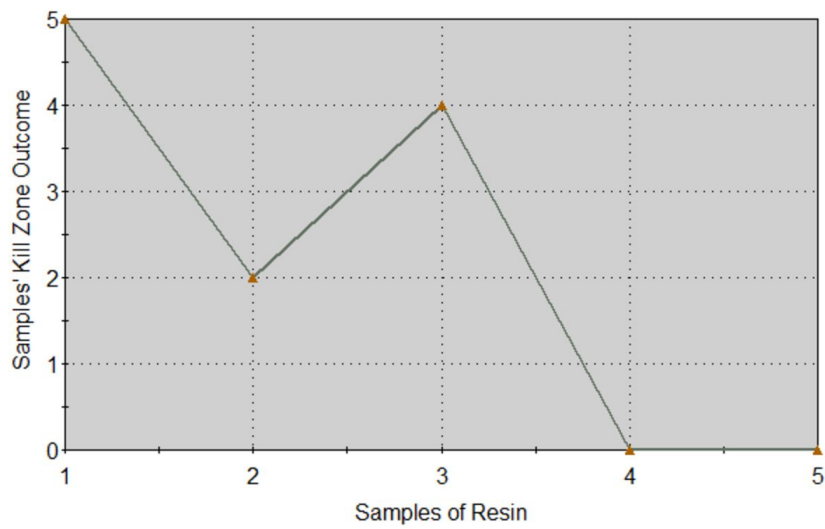
The procedure took place to analyse the data/results of a bacterial count before and after the testing of the sap/resin ointment, and the flammability of ground resin compacts. This procedure I conducted with an accuracy test of each supply within the package. The outcome of the package concluded my hypothesis, that tree sap has multiple uses and variations of how the user can apply it to one's everyday outings and circumstances.

Data/ Experimentation Results:

Flame Longevity of Resin



Resin Bacteria Kill Test



Longevity of the resin flame and bacteria kill experiments of the resin were documented into graphs made on my computer showing that my results correlated to my hypothesis but needed fine tuning. The graphed data of the experiment told me that resin is a flammable substance that can be used as an antibacterial as well. All variables of this experiment were taken into account with the control being the amount of same amount of sap used in each sample. During this experiment, the samples' data was taken at the same place and time. All experimentation pyro and bacterial concluded that sap is a usefully multi purposed substance that is reliable in the creation of fire and the disinfectant of wounds containing bacteria.

In conclusion, my hypothesis was correct when my results directly correlated after comparing my pyro longevity and bacteria kill zone experimentations. The data of my project and others have officially pointed out that resin itself has multiple uses that are extremely helpful in most any situation. Therefore whenever you see tree resin gliding down the trunk of a tree you may have the knowledge to use the sap for practical and medical uses, these uses are also provided within the resin kit.

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*Graphs were created by Kate Martin on <https://nces.ed.gov/nceskids/graphing/classic/bar.asp> with data from my own experiment and collection of data.

*The photos used in this document and on the poster board, to show the natural appearance of resin were taken by Kate Martin on my own Nikon D7100.