

The Best In-Law Firewood

Hailey Thomas

9th Grade Physical Science

Mr. Kevin Keeley

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Abstract

On the Navajo Nation many families are not able to afford electric heaters so to solve that problem we build fire during the cold winter season and use different types of wood. So which fire wood is able to keep the house warm? but which fire wood lasted the longest? The project was determined on 4 different types of woods that were used in the experiment cedar, pine, oak and Russian olive. I record the temperature on the stove top to see how hot it would get, but also record the room temperature. Meanwhile having a stopwatch on the side to see how long the fire would last, before the fire turns into red amber. Then using the red amber to start the fire wood. I tested the woods for 5 days straight every night while taking notes. In the end I found out Pine burn the hottest and turning the house into a sweat lodge. The highest temperature the stove got was 700 degree and the fire lasting more than 1 hour and room temperature to 109 degree. Meanwhile oak last the longest having it go more than 1 hour and 29 min and stove top hitting to 500 degree and room temperature hitting to 93 degree. I say the project was a success because my predication was right and I answer my own question and learn more information about different types of wood and how to determine which one which.

Question

Which firewood would burn the hottest and burn the longest?

Variables

Independent Variable: The different types of wood

Dependent Variable: The room temperature and how long it will burn

Control Variable: The amount of wood I put In the fire which was 3 woods, the room I was in, and the same stove.

Hypothesis

When I test the different types of wood, I say that pine wood would burn the hottest, and oak would burn the longest.

Background Research

On the Navajo Nation many families are not able to get electricity or not able to afford electricity because they live in remote area where it will cost thousands of dollars to put electricity post in order to create electricity where they live. So since many families don't have electricity we can't use electricity heater like most housing due in the city. Instead we have a wood stove and we build fire in order to keep us warm in the winter. On the Navajo Nation we live in Hogan's and modern homes, depending on the size of the house determine how much wood is needed to burn. During the months of spring and summer many Navajo families go wood hauling, but they must have a wood hauling permit to get woods to store for the winter season. During the winter season we don't know if it going to snow, but it tend to get colder during the fall that why we go wood hauling during spring and summer months. Certain types of wood are locate on different part of the reservation. For example if you only wanted to find only oak you would go to the mountain area. Cedar wood is easy to chop and more easier to start,

cedar is found in mountainous area. Cedar wood is easy to chop even if it dry and has a pleasant aroma. Pine tree has needles that are sharp and can measure to 11 inches long. On the pine tree there is a thing called pine sap that is very messy and sticky that can be easily stick to your clothes. Pine is easy to split if there no knots on it but if there knots then it going to be difficult to chop. Oak wood is very heavy, but it could be easy to chop supposal when it is frozen other time it difficult to chop. Once you chop the Oak and burn the oak it will burn for the longest time and it will burn to hot temperature. Russian Olive is found near the water it leaves are soft and grows up to 10 to 25 feet tall. I wasn't able to find information about Russian Olive as a firewood though just says that it burns really slow, but it is easy to chop from experience just as long as the wood is not wet.

Material List

- Matches (starting the fire)
- Wood (pine, oak, cedar, Russian Olive)
- Stove Thermometer
- Room Temperature Thermometer
- Newspaper (To Lit the fire)
- Firestarter which were wood chip
- Stopwatch
- Notebook
- Pen

Experimental Procedures

1. First of all you need to gather the woods you are going to use which are 3 pines, 3 oak, 3 Cedar, 3 Russian olive

2. Once you get your woods you about to start the project, but make sure you clean out the ash before you start the fire it could affect the heat and time of your wood
3. Get Newspaper and your woods chips which is going to be your fire starter
4. Get your match and stopwatch ready, make sure you get the room temperature you started at and make sure the stove thermometer is at 0 degree
5. Once you lit the match you start the newspaper and the making sure the wood chip was caught on fire to then start the stopwatch and check what time you start the fire to
6. Then start adding the wood you wanted to test first I add 1 at a time until the fire was strong enough to support 2 more woods
7. Once after that I checked the fire every time the stove thermometer hit 100 degree then I will check the room temperature and check the stopwatch for how long it took for the fire to hit 100 degree and keep doing that every time the stove thermometer would get every 100 degree
8. Repeat step 7 until the fire turns into red amber
9. Once the fire turn into red amber you stop the timer then check the room temperature one last time to see what the room temp was
10. Once you did step 9 then put in 3 more woods but make sure they are different, the reason we put wood once it turns into red amber is because it going to take a while to make the fire start again
11. After that repeat the whole process again step 6 – 9 again until you are finish

Data Analysis and Discussion

	Time the fire start	Time the fire End	Highest Temperature	Highest and lowest Room Temperature	The time the temperature hit 100
Cedar Wood	5:40 pm	6:56 pm Lasted for 1 hour and 14 mins	400 degrees	87 degree 84.7 degree	51 sec into the fire it hit 100
Oak	7:34 pm	9:17 pm lasted 1 hour and 41 mins	600 degree	102 degree 67 degree	35 minutes and 48 second
Pine	7:34 pm	9:17 pm lasted 1 hour and 41 mins	600 degree	102 degree 67 degree	35 minutes and 48 second
Russian Olive	9:18 pm	10:07 pm Lasted 58 mins and 39 sec	300 degree	92 degree 85 degree	12 minutes and 25 second

Firewood Day 2

	Time the fire start	Time the fire End	Highest Temperature	Highest and lowest Room Temperature	The time the temperature hit 100
Cedar Wood	4:17 pm	5:11 pm Lasted 55 mins and 33 second	500 degree	92 degree 70.6 degree	6 mins and 9 second
Oak	5:18 pm	6:35 pm Lasted 1 hours 21 min and 39 sec	300 degree	92 degree 78 degree	4 mins and 28 second
Pine	6:38 pm	7:32 pm 53 min and 55 sec	600 degree	115 degree 88 degree	1 min and 33 sec
Russian Olive	7:34 pm	8:33 pm	400 degree	102 degree 91 degree	3 mins and 37 sec

		59 mins and 33 sec			
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Firewood Day 3

	Time the fire start	Time the fire End	Highest Temperature	Highest and lowest Room Temperature	The time the temperature hit 100
Cedar Wood	5:27 pm	6:28 pm 1 hour and 47 sec	400 degree	85 degree 70 degree	10 mins and 12 sec
Oak	6:29 pm	7:54 pm 1 hour 24 mins and 5 sec	500 degree	86 degree 78 degree	9 mins and 49 sec
Pine	7:59 pm	8:39 pm 41 min and 4 sec	800 degree	86 degree 80 degree	4 min and 37 sec
Russian Olive	8:57 pm	10:27 pm' 1 hour 29 mins and 24 sec	400 degree	89 degree 76 degree	7 min and 39 sec

Firewood Day 4

	Time the fire start	Time the fire End	Highest Temperature	Highest and lowest Room Temperature	The time the temperature hit 100
Cedar Wood	4:10 pm	5:34 pm 1 hour 29 mins and 17 sec	500 degree	66 degree 80 degree	4 mins and 48 sec
Oak	5:40 pm	7:03 pm 1 hour 24 mins and 10 sec	300 degree	80 degree 79 degree	2 mins and 55 sec
Pine	7:06	8:36 pm	600 degree	103 degree 79 degree	10 mins and 25 sec

		1 hour 30 mins and 06 sec			
Russian Olive	8:37 pm	10:01 am 1 hour and 25 mins	300 degree	86 degree 88 degree	6 mins 35 sec

From the table from the experiment I notice that Pine had more affect and higher temperature than all the other woods I tested. Meanwhile oak lasted the longest, but also Russian olive lasted for a while too. The result looked good and seems accurate and constant through the project. The only thing was during the first day it took while since it snowed and the wood was wet so maybe that the reason why the oak was difficult to start. I notice that oak took a while to start and now that I know oak is used to continue to keep the fire going and not to have oak alone. So pine burns the hottest and has a more affect on the room temperature, meanwhile oak had a longest effect, but Russian olive had a longer time so it was going between Russian Olive and oak that made the fire longer.

Conclusion

My hypothesis was that Pine would burn the longest and that oak will burn the longest. In conclusion from the experiment I did, Pine was the hottest it burned it reached up to 600 degrees, but the con about burning pine was it didn't burn that long. Meanwhile Oak on the other hand didn't burn as hot, but it did burn for a long time. I was surprised that Russian olive did burn for a very long time, but I did notice that Russian olive didn't warm up the room enough it was still cold and the fire wasn't that hot as pine was. Cedar on the other hand it was average, but the time of the cedar seems short. Pine is a good wood to burn if you want your house to be like a sweat lodge because it will get hot like hot. If you want the fire to keep going for a long time I would

recommend Russian Olive and Oak. If you want a average amount of heat and temperature and want it to last for a while I would go with Cedar wood.

Acknowledgement

I would like to say thank you for my mom for helping me do this project by bringing in the wood. I would also like to say thank you to my grandpa who helped me chopped the woods. Then thank you to Mr. Keeley for letting me have more time to finish my project.

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