Adding value to bee products in Tanzania

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While the initial products from beekeeping are honey and beeswax, these will provide greater supplements to household income if further made into valued added products. Dr Sara Robb has been working with Honeycare Tanzania to develop value added products with honey and beeswax. In this article she explains how to adapt recipes to use locally sourced ingredients for making products such as beeswax lip balm and honey soap.

Value added products are best made from the locally sourced ingredients that are readily available to beekeepers. Start with one recipe and make adjustments as necessary.

Beeswax lip balm

Basic sunflower lip balm base is made with beeswax, cocoa butter and oil in the proportions: 20% beeswax, 20% cocoa butter, 60% sunflower oil.

The method is simple: just warm all the ingredients until the beeswax and cocoa butter have melted. Stir, and pour into pots.

Modify this basic recipe to include local ingredients. For example, sunflower oil can be substituted by a locally available vegetable oil. If cocoa butter is not available, African shea butter can be used although some experimenting may be required to get the correct consistency.

Another consideration is climate. If you are making lip balm in a very hot climate, you may need to adjust the recipe to ensure the finished product does not melt in the heat. However, because all the ingredients are blended together and there is no chemical reaction to consider, the worst that can happen is your lip balm will be too soft or too hard. If the lip balm formulation is too hard, add more liquid oil. If the lip balm is too soft, add more beeswax. The biggest challenge about making lip balm in hot climates is to have the lip balm soft enough to use on cool days, yet not to melt on very hot days. Therefore you will need containers that close tightly and will not leak if the balm melts on hotter days.

Honey soap

While a small adjustment may be necessary to optimise the recipe when making lip balm, changing a soap recipe is a little more complicated. When making soap it makes sense to use oils that are readily available and locally sourced. However you must consider the chemistry when making changes to soap recipes. It is advisable that you start with a recipe you know well so that you know what the resulting product should be like. The recipe we use has been formulated by Sara Robb - for more detailed instructions, please use the published recipe (see further reading). Here we will not cover the basics of soap making, but instead focus on how to adjust the recipe for local resources.

Basic Recipe 1- Olive, Sunflower, Palm and Coconut Oil

Lye solution: 112 g sodium hydroxide (NaOH), 200 g water.

Oil Mixture: 468 g coconut oil, 175 g palm oil, 150 g olive oil, 125 g sunflower oil, 15 ml honey.

Method

1. Add the sodium hydroxide to the water and stir - this makes the lye.
2. Mix all the oils and honey together.
3. Slowly add the lye to the oil mixture. Stir until the soap mixture begins to thicken.
4. Pour into a pan and cover to retain heat. Keep the soap covered until the soap has processed.
5. Uncover the soap, remove from pan and cut into blocks.

This recipe yields a relatively hard soap with a good lather which is moisturising. It was the recipe Honeycare Tanzania used as a starting point - however the finished soap was slightly softer than expected.

Two common problems that you may encounter when making soap and that will lead to the soap being too soft are impurities in the sodium hydroxide and unclear labelling of oils. It is unlikely that you will produce a soap which is too hard, because recipes for making soap are super-fatted, and contain additional oil which is not involved in the chemical reaction.

Impurities in sodium hydroxide

When making soap it is important to check the purity of the sodium hydroxide (NaOH) that you use: a purity of 98% is recommended. If the NaOH contains impurities there is less hydroxide to react with the oil and the soap will be softer than desired. Check the packaging for an indication of the purity of the NaOH. Start with the familiar recipe, and adjust as you need to. You can calculate the amount of NaOH necessary to completely convert all your oils to soap using the table overleaf. From this value, you will be able to determine the percentage of free oil your recipe contains. It will not be feasible to have the NaOH tested, so I use the calculated value to convert all oil to soap as my maximum value. By knowing these values, you can safely increase the amount of NaOH in your recipe without exceeding the maximum value. If the original recipe contains 20% excess oil, you may wish to increase the amount of NaOH used so the recipe theoretically contains only 10% excess oil.

Remember these values are theoretical and the actual amount of excess oil will be higher if you have impurities in the NaOH. NaOH that is 98% pure will result in 2% excess oil. When increasing the amount of NaOH, you will need also to proportionally increase the amount of water used to dissolve the NaOH.

Unclear labelling of oils

When sourcing local oils to use in the soap recipe, you may find the labelling is not completely clear. Oil may be labelled as 'palm oil', but the labelling may not indicate whether this is palm or palm kernel oil. The NaOH factor will be multiplied by the amount of a specific oil, to determine how much NaOH is necessary to convert that oil to soap. Each oil has its own NaOH factor and as a result, different amounts of NaOH are required to convert different oils to soap. Table 1 shows that palm oil and palm kernel oil have quite different NaOH factors. If you use palm kernel...
oil in a recipe which calls for palm oil, the resulting soap will be softer than anticipated. You may also find that some oil labelled ‘vegetable oil’ will give no further indication of what specific oil the bottle contains. A local person may be able to recognise the oil or you may be able to contact the manufacturer to determine from what plant the oil is derived.

**Making changes to the recipe**

You may substitute oils in recipes which have the same or very close NaOH factors. The above recipe calls for sunflower oil. The NaOH factor for sunflower oil is 0.136 so appropriate substitutions would be olive oil or soya oil which have the same NaOH factor. Corn, palm kernel and peanut oils, with NaOH factors of 0.137 are close enough that the substitution can be made without doing any calculations. Other substitutions will require a calculation of the amount of NaOH to use.

When developing products in different regions, modifications to familiar recipes may be necessary to accommodate local ingredients, and the recommendations provided here will provide a starting point.

**Table 1: Calculating the maximum amount of NaOH to use in soap recipes**

<table>
<thead>
<tr>
<th>Oil in recipe</th>
<th>Oil (g)</th>
<th>NaOH factor</th>
<th>NaOH required (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut</td>
<td>X</td>
<td>0.184</td>
<td>86g</td>
</tr>
<tr>
<td>Corn</td>
<td>X</td>
<td>0.137</td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td>X</td>
<td>0.139</td>
<td></td>
</tr>
<tr>
<td>Olive</td>
<td>X</td>
<td>0.136</td>
<td></td>
</tr>
<tr>
<td>Palm</td>
<td>X</td>
<td>0.143</td>
<td></td>
</tr>
<tr>
<td>Palm kernel</td>
<td>X</td>
<td>0.137</td>
<td></td>
</tr>
<tr>
<td>Peanut</td>
<td>X</td>
<td>0.137</td>
<td></td>
</tr>
<tr>
<td>Soya</td>
<td>X</td>
<td>0.136</td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>X</td>
<td>0.136</td>
<td></td>
</tr>
</tbody>
</table>

Total NaOH required to convert all oil to soap = 148g

For a 10% super-fatted soap: 148 g x 0.9 = 133 g NaOH
To calculate water required: 133 g NaOH ÷ 0.56 = 238 g water

**Further reading**


A new book *Bee Healthy, Bee Beautiful* by Sara Robb is soon to be published. Watch for the review in a future edition of *BfDJ*. “A recipe book focusing on the anti-oxidant properties of bee products and how to incorporate them into your diet and beauty routine”.

Sara Robb and Jayen Chandarana

Sara Robb has a PhD in neuroscience from Hershey Medical School, Pennsylvania, USA. In 2003 she started her company Bath Potions which specialises in cosmetics containing honey and beeswax. Sara has a continued interest in developing value added products for beekeepers.

Honeycare Tanzania was established in 2004 to trade in honey and provide training, support and equipment to beekeepers. Currently, Honeycare Tanzania has ten collection centres in Tanzania where honey and beeswax are bought from village beekeepers and training is provided. Honeycare Tanzania pays a fair price to the beekeepers for their produce.

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