Teacher: Mr Poore, Biology, Joshua Malina **Start date: 28/06/05**

An Individual Study
- How do different oil types affect the growth of tomato plants?

Detailed background information and research that has been collected will be included in the section entitled 'Introduction.'

An overview of background information

In terms of oils, as a general rule they may be split up into two general categories. The first are known as light oils. Light oils tend to be thick and dark, yet very volatile. On the contrary to the heavy oils are black and adhesive and rather less volatile and therefore less easily evaporated. The tomato plants have been chosen as they are readily available and easy to come by. I also have experience in growing tomato plants which should ensure a fairly 'smooth operation.'

Hypothesis

My hypothesis is that oils termed 'light' will affect plant growth more quickly than those oils that are know as 'heavy' oils. I also suggest that the main affect will be to slow down plant growth and eventually cause death to the plants being grown. The light oils should affect the plant more quickly due to them being less viscous and thus seeping down through the soil more easily whilst the heavy oil type is likely to just 'sit' on and within the soil or quite a length of time longer thus meaning it takes longer to reach the plant itself.

Apparatus

- Soil
- Water
- Measuring jug/cylinder
- Light oil: diesel oil
- Heavy oil: bunker oil
- Tomato seeds
- 30 small plant pots/containers
- Spraying facility
- Safety goggles
- Ruler
- Labels
- Pen(s)
- Rubber gloves

Outline Method

1. I will gather 10 seeds for each category and plant them; i.e. 10 for light oils, 10 for heavy oils and 10 for the control and un-oiled plants.
2. These pots will then be labelled accordingly.

3. All planted seeds will be then placed inside the greenhouse and from then onwards at set intervals oil and water will be added as well as being measured.
4. Details of changes will be noted and recorded.

Please note the above is only a very brief account of the method that is to be more fully developed later on in the section entitled 'method.'
I hope to use the Spearman's Rank Correlation Coefficient statistical test to seen/prove any relationship noted.

Controlled variables

All of the seeds for the tomatoes will come from the same packet and hence they will be of same make and type. The soil these seeds will be placed in will be the same for all. I also plan to add the same volume of oil to each of the plants each time an application occurs. Furthermore the water they receive will be of the same volume and from the same source. The same oils will be used throughout to help produce reliable results. The environmental surroundings are also going to be controlled in a glasshouse that will provide a constant temperature and the same quantity of light to each plant.
These variables need to be controlled in order to only measure the intended variable rather than those that I do not want to investigate. I.e. the affect of different oils on plant growth rather than any other investigation. In this context plant growth will be monitored in terms of changes or variations in plant height.

Risk Assessment

Whilst this is unlikely to be considered a particularly hazardous investigation, as always precautions to ensure safety is required. To begin with I will wear safety goggles in case whilst spraying or applying the oil any of the substance comes near the eye area. Also gloves will be worn to avoid contact with hands as oils often seem to have a tendency to stick and cling to the skin. Further more a lab coat shall be worn at all times whilst carrying out practical work this again is as a result of the damage oils can cause. At no point whilst practical work is taking place should anybody run or even walk fast in the laboratory to avoid spillages. I will stand up whilst engaging in practical work; this will help to keep a more focused approach that will reduce the chances of accidents occurring. If any spillages occur they will be cleaned effectively and promptly so that work can resume. There will be no consumption of food or drink in the laboratory in order to ensure safety for all individuals as there are always possibilities that these consumption items may have come into contact with an irritant or potentially toxic chemical; (or more likely; oil) which could have large health implications.

Ethical Implications

I cannot see any real ethical implications to other living organisms or animals and therefore there seems as though no negative externalities will be yielded from this investigation. However it could be said that by using oil it is a waste of a scarce and finite resource.

Note regarding absence of pilot studies

As a result of time restrictions and the length of time required for the plants to grow it was felt that any preliminary work would not be completed within the time constraints. Furthermore in the main I believe that the variables mentioned will be controlled very well and thus meaning that the results produced in the final implementation will be reliable and accurate. Also; as there are numerous repeats for each category to be investigated it is thought that results produced will be of some precision; and any anomalies should be easily identified.