

Greenhouse Circle

This circle was formed to address the needs of UBC-O for greenhouse space. Decisions about greenhouse space need to be made quickly given that the current, small greenhouse, which is located on the roof of the Science building, will have to be moved in order for a new third floor to be built. The best way to meet our teaching needs for greenhouse space is to move the current greenhouse to the new roof of the Science building. A new research greenhouse could be located elsewhere on campus. Temporary greenhouse space will be required to house the teaching collection while the Science building is being renovated.

Current demands on the existing greenhouse

The Faculty of Science (primarily Biology, but also Chemistry and Earth and Environmental Science) requires greenhouse facilities for both research and teaching. The heaviest use is currently for teaching, with research projects scheduled during times when the teaching requirements are low. The demand for research-grade greenhouse space has increased dramatically over the last year, with the addition to the Faculty of Soheil Mahmoud (nominee for CRC in Natural Products Chemistry) and Louise Nelson (VP Research).

Greenhouse plants and/or the greenhouse facility itself are used in the survey portion of the first year courses (Biology 111, 112, 121, 122) and in the second year vascular (Biol 251), non-vascular (Biol 241) plant courses. Plants are moved between the labs and greenhouse on a weekly basis. The greenhouse is also used for student-run experiments in the second year development course (Biol 263), the third year plant physiology (Biol 351) and will be used in the natural products chemistry course (Chem 418) this fall. In Biol 351, students conduct an independent experiment during which they are expected to care for and manipulate their plants. Students in Biol 263 and 351 are required to visit the greenhouse several times per week outside of scheduled laboratory hours.

Research experiments are conducted in the greenhouse during periods when teaching demands are low (summer and fall). Conifers and aromatic herbs are the most common types of research plants presently being used for research. Both of these groups of plants require maximum natural irradiance and daylength, with supplemental high intensity lighting during the winter. Some faculty, who would like to perform greenhouse research, have not been able to up to this point because the current greenhouse is too small to segregate mutually incompatible experiments. Greenhouse-based research frequently has to be delayed because of lack of space, especially during the teaching semester. The sporadic and temporary nature of available space in the existing greenhouse has also precluded most long-term experiments.

Environmental requirements of the teaching collection

The teaching collection comprises a large number of plants that have been collected and maintained over the years at great time and expense. These plants represent a range of botanically significant taxa, many of which are tropical and thus particularly sensitive to low temperatures. It is essential that a suitable location (i.e., some kind of temporary greenhouse) be found for these plants during the construction period. Replacing these is not a trivial task and cannot be done on a semester or even an annual basis.

Location requirements for new or relocated greenhouse(s)

- * Exposure to light from the east, south and west (full photoperiod)
- * Direct indoor access to teaching or research lab
- * Room for future expansion as needs increase.

1. Exposure to light

Greenhouses should be situated where they can intercept the most natural light. Many of our teaching and research activities involve crop plants or conifer seedlings. These require high irradiance in order to develop normally. Maximal access to light can be achieved either by placing the greenhouse on a roof, or on the ground, but away from the shading effect of other buildings. Placing a greenhouse on an east, west or north side of a building will not provide sufficient light.

2. Indoor access to plants

Greenhouse space dedicated to teaching must be located in the same building as the teaching labs. Plants are moved regularly from the greenhouse to teaching labs for use in 4 first-year, 3 second-year and 1 third-year Biology course, with extensive use planned for a new fourth-year chemistry course in Fall 2004. It is not feasible to transfer plants from a distant greenhouse into a vehicle for transport to the teaching labs. This is because plants are susceptible to something called "chilling injury". Tropical plants, or even temperate plants that are not dormant, can be irreversibly damaged by even a few minutes of exposure to temperatures below 5 °C (for some tropical plants even 14 °C can cause damage).

Although there is more flexibility with respect to the location of research greenhouses, chilling or frost damage is clearly unacceptable. Isolated research greenhouses must then have associated lab or prep room facilities in order to be functional (depending on the nature of the research).

3. Room for future expansion

A separate research greenhouse is a necessity in the new UBC-Okanagan. A number of OUC faculty conduct experimental botanical research under less-than-ideal greenhouse conditions at present. With the new research focus at UBC-Okanagan, this requirement is

anticipated to increase as faculties expand their research programs. We anticipate that new faculty hired to support the Natural Products, Biology, or Environmental Science programs will also require research greenhouse space. It is important that both the teaching and research greenhouses be located so that greenhouse needs arising over the next 20 years can be met by expanding existing facilities.

Our recommendation

All three of these criteria can be met by placing the greenhouse facility on the roof of a building and this is the preferred solution in particular for greenhouses dedicated to support of teaching. It is no accident that most universities adopt this ideal solution for teaching greenhouses. The ideal situation would also be to place a research greenhouse on the roof, but other criteria (e.g., high space requirements; need to separate conflicting experiments) may make a ground location optimal, as long as occasions for moving plants around are infrequent.

Are there alternatives to our recommendation?

An alternative to our suggestion of moving the existing greenhouse to the roof of the new third floor of the Science building is to relocate the greenhouse to a distant part of the campus and to attach a teaching lab to this greenhouse. This is not be a realistic option for the following reasons:

- In order to offer first year Biology there, all of the teaching supplies for the first year Biology labs would have to be relocated there. These are shared with other lab courses and so much of this material would have to be duplicated.
- Second, due to the large number of first and second lab sections, at least three teaching labs would need to be built attached to the greenhouse.
- Third, students in the second and third year classes need to visit the greenhouse outside of class time and they would not be able to do this if the greenhouse was located in a distant part of the campus.

Some pressing timelines

The existing teaching collection will need a home before the present greenhouse is disassembled. Any transfer of plants must take place before the onset of cold temperatures. In addition, there is one long-term research project in progress that must be moved with as little disruption as possible. A temporary holding greenhouse (heated!) must be available and ready to receive the collection, prior to the dismantling of the existing facility.