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Updating the Canadian Organic Standards

Some petitioners propose artificial light allowed as the sole source of light in greenhouses

The question of light

By Janet Wallace

Organic farming practices are based on natural ecological processes. For example, we rely on legumes and rhizobia to provide nitrogen. We depend on soil life to release nutrients from compost, manure and green manures. We count on predatory and parasitoid insects to control pests. In so many ways, we seek to replicate nature. This applies to nutrient management, pest control, livestock husbandry, but what about light…Can organic food be grown without natural light? This challenging question is being discussed amongst the Greenhouse Working Group involved in the review of the Canadian Organic Standards.

Right now, the Canadian Organic Standards permit “supplemental lighting” in greenhouses and other structures. This was interpreted to mean that natural daylight is required. The petitioners proposed artificial light allowed as the sole source of light. They maintain that growing plants using natural light is not possible during the winter in much of Canada, particularly the North.

The days are too short and the daylight too weak to provide adequate light. Also, artificial lighting can be used to grow food inside warehouses in urban areas.

Eating local organic food in the Canadian winter

To eat locally grown organic vegetables throughout the winter in Canada, the options are limited. One sustainable choice is to eat seasonally and focus on root vegetables, squash and other storage vegetables, perhaps supplemented by sprouts and microgreens from unheated greenhouses. A number of organic consumers choose the seasonal diet but many consumers want more variety and fresh food throughout the winter.

Another option is to eat Canadian organic vegetables grown in heated greenhouses under a mix of natural daylight and supplemental lighting. In greenhouses, even unheated greenhouses in the warmer areas of the country, people may be able to harvest cold-tolerant throughout the winter but the crops, even cold-hardy salad greens, usually aren't actually growing in mid-winter.

A more recent alternative is food from growth chambers or urban warehouses where vegetables are grown under energy-efficient lighting in insulated buildings.

When plants are grown hydroponically – in water and fed entirely by with soluble nutrients – they do not qualify for organic certification.

But…what if the food is grown under artificial light in soil contenants and the operators follow the organic standards in all aspects except for sun as the main source of light: should the standards be changed so this produce can be certified organic?

"Organic growing is about life and its interaction with other life and the whole ecosystem," stated one member of the working group. "The sun provides an important input to this ecosystem. Indoor warehouse growing is about inputs and monoculture. It is not about organics."

"We want to be sure that we allow for urban farming which often makes innovative use of space in urban settings," said another participant.

What about the Far North? The question "Can you grow organic in the Arctic in a protected system?" was posed.

As with many issues facing the Organic Standards Review Working Groups, the question of lighting is complex and raises concerns over energy use, biodiversity, quality, food sustainability and the precautionary principle.

Energy use

When considering the impact of organic farming practices, the reviewers consider the global impact of food production. Ideally, organic farming practices are energy-efficient and have the lowest possible emissions of greenhouse gases.

Supporters of artificial lighting suggest that indoor growing systems are an energy efficient option compared to long-distance transportation of food or greenhouse growing. If natural daylight is required, windows or glazing is required and this will lead to heat loss. In contrast, the walls and ceilings of a growth chamber can be insulated.
The question of energy efficiency becomes a bit more complicated when you look at the whole picture. For example, indoor farming systems use electricity not just for lighting but also for ventilation and air conditioning.

Biodiversity

When the topic of biodiversity on organic farms is discussed, we often hear about practices such as protecting bees, planting insectary strips and reducing tillage. Rarely do we consider how the quality of light may affect the agroecosystem, but lighting does have an effect.

Consider, for example, greenhouse plastic that blocks the transmission of UV light. Plants grow well under this plastic and workers don't get sunburns (as they would inside a glass greenhouse). However, after organic operators introduced bees into the greenhouse, they found that the bees fled the greenhouse whenever a door or vent was opened.

It turned out that bees, like many other insects, need UV light to see. Essentially, the bees couldn't find their food sources or find flowers to pollinate without UV light. (Changes have since been made to make greenhouses bee-friendly.)

Organic farmers value soil life, but we don't know much about the role of the life on leaves. Foliar sprays of compost tea can boost crop growth by affecting the microbial life on the plant canopy, but how other factors, like light, affect the canopy ecosystem is unclear.

Quality

Plants grown under natural light taste better and store longer, stated one greenhouse consultant. He cited scientific studies which back up the statement and added “Since current LED and HPS lights do not generate near UVA and near infrared spectrums, the plants and their supporting ecology are not as healthy (and flavourful) as they should be.”

Other people argued that the latest versions of LED and HPS lights can come close to natural light and provide 98% of the photosynthetically active radiation, the amount of light available for photosynthesis. How critical, opponents asked, is the other 2% and can we even measure all the essential elements of daylight?

Food sustainability

“Urban farming is key to development of ‘zero-km’ agriculture,” stated a supporter of 100% artificial lighting. “People live in cities, not in rural areas. It is better to buy organic vegetables grown in growth chambers than imported vegetables traveling 2600 km on average.”

“Natural light is basic, but to feed a growing population in cold countries,” she continued. “It has to be supplemented to raise yield and stabilize producers’ income. This supplemental lighting has helped develop a lighting technique ensuring a food production that is independent from external weather conditions. That will help face the climate changes that will affect all of us.”

“Organic agriculture has to evolve; its modernization will help produce quality food under various systems. It is essential for reaching food sovereignty. That is what consumers want,” she concluded.

Precautionary principle

One person argued that we can’t allow a dependence on artificial lighting since we just don’t know the effects. “Sunlight enables photosynthesis in plants, but it also affects other life in the ecosystem and the plants in a myriad of ways which we are only just beginning to understand.”

What are the possible solutions?

The petition recommends allowing artificial lighting “as long as the photosynthetic light spectrum received by the plant represents more than 70% of the photosynthetic light spectrum provided by the sun in winter conditions and that its photosynthetic lighting efficiency per unit of energy supplied is at least 2.07 micromoles per joule (sun equivalent).”

Other options:

- Limit 100% artificial-lit production to crops harvested within 30 days of seeding.
- Consider allowing 100% artificial lighting in the far North by making an allowance for operations above a certain latitude.
- Maintain the standard's requirement that the artificial light can only supplement, not replace, natural daylight.

What do you think? Contact a member of the CGSB Committee on Organic Agriculture to share your views. The committee includes representatives from organic commodity groups, as well as national, regional and provincial organic organizations. Also, keep up to date with the Info-bio newsletters and find out what the committee decides.

SIDEBAR

Principle of health – Organic agriculture should sustain and enhance the health of soil, plants, animals, humans and the planet as one and indivisible.

Principle of ecology – Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.

Principle of fairness – Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Principle of care – Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment**.**

Lighting terms

LED: light-emitting diode

HPS: high pressure sodium

PAR: photosynthetically active radiation, is the amount of light available for photosynthesis

UV-A (320-380 nm): predominant type of UV in the solar spectrum and the light used by insect pollinators to "see colours."

UV-B (280-320 nm): component of sunlight that causes skin cancer, reduces growth rate in plants and degrades plastic.

UV-C (100-280 nm): used to disinfect water.