HYDROPONICS AND MEDICINAL PLANTS – OUR RESEARCH

By Noucetta Kehdi

For the hobby gardener, growing hydroponically offers enormous opportunities and sometimes opens unsuspected alternatives. When you start a hydroponic system with the proper nutrients you are generally stricken by the rapidity of growth and the vigour of your plants; not to talk about the profusion and generosity of your yields! Often this leads to unexpected vocations.

Medicinal plants and hydroponics? This may sound like an odd marriage, and yet...

During our long years of research on plants and hydroponics, one of our goals was to attain unequalled growth allied with excellent crop quality and high "essential" content. Another objective was to offer new alternatives to small commercial growers, associating them to successful and economically independent ventures. During these years we came across a large variety of plants, and nearly each time the results were astounding. Plants were plentiful, beautiful and healthy, they smelled sweet and tasted great: they were rich in active principles.

What is an active principle?

The active principle in a plant is the original inherent constituent, which characterises a substance, and gives it its essential properties: power to heal, to cure, to nourish, etc. Most often people will think that an active principle is only characteristic to medicinal plants. But it is not. Fragrance and flavour are the results of active principles too: the sweater the smell or the stronger the taste, the higher is the content in the correspondent active principles.

So quite naturally a section of our studies was directed to culinary and therapeutic plants. But if it was easy to choose the right culinary plants (basil, sage, mint, parsley, chives, etc), it was much more difficult to determine which medicinal would be interesting to cultivate. The idea was indeed to establish a list of high value cash crops that we could grow in our greenhouse in France, analyse, and eventually suggest to potential small-scale commercial growers.

In order to be sure of our choice we contacted, in 1998, the University of Toulouse and it's Faculty of Pharmacognosis. They would know which plants are compatible with our studies. It was indeed important for us that once analyzed our hydroponically grown crop would be truly compatible with the Pharmacopoeia's requirements. The faculty suggested a few plants from which we chose Hieracium pilosella and Hypericum perforatum. Indeed both of them had value and were excellent candidates for economical, practical, and of course, for medicinal purposes.

Hieracium pilosella

Hieracium pilosella - flower

Hieracium pilosella (also called Mouse-Ear Hawkweed,) is a soil-cover, rampant (30 cm maximum) colony-forming plant. It is a perennial, stoloniferous herb whose rosettes form dense, prostrate mats. Each rosette produces a single, lemon yellow flower between May and September. Seeds stay on the plant until end of winter. Leaves vary in size according to habitat, from 2x 0.5 cm in drier, less fertile sites to 10 x 2 cm in moister, more fertile sites. The under-surface of the largely smooth leaves has a dense cover of white hairs.

Hieracium pilosella is used since the ancient times for its several medicinal qualities, and mainly as a "cleaner". In the past the sap was used to accelerate the cicatrisation of internal and external wounds and to relieve kidney malfunctions.
Today it is still used. It is known as an astringent, with strong diuretic, depurative, and antibiotic properties. It is often used to eliminate superfluous water from the body and increases the secretion of the gall bladder.
All parts are used.
The most common way of preparing it is by infusion of the fresh leaves for internal cleansing. An old recipe says: 100g for 1 litre of water infuse for 15 to 20 minutes and take 3 cups/day.
For external use crush the fresh leaves. They act as a detergent and help heal atonic wounds. *(See notice at the end of the article)*

Hieracium pilosella - young plants

Hieracium easily adapts to all substrates and is quite easy to grow. But it has 2 characteristics that make it less attractive to traditional soil growers:

1 – it is "allelopathic" which means "invasive": Hieracium pilosella

forms dense mats in open space through vegetative development and extends quite rapidly. Its roots emit a substance inhibiting neighbouring root growth, which makes it a true intruder in some countries. Indeed it is recorded as a weed and even forbidden to import in some countries like Australia, or Canada because, when conditions are met, it competes with neighbouring plants to the point of invading the soil completely and threatening local biodiversity. It is a native of England and grows well in the rest of Europe, especially in areas like the dry prairies of the Pyrenees. It forms a very pleasant mat to walk upon, and makes an excellent candidate for lawns in poor soil.

Hieracium pilosella before harvest

2 – it is a rampant, which has 2 disadvantages when harvesting:
- When in contact with soil, the blades of the harvesting machines become blunt. They have to be regularly sharpened or replaced, and become an economical setback.
- The harvest is dirty, full of soil and debris, and has to be cleaned before starting proper processing, which represents another economical burden.

While being and obstacle for soil growers, these 2 disadvantages make Hieracium pilosella a perfect candidate for hydroponics. Indeed, the plant is cultivated in enclosed growing modules and cannot spread out. No need for harvesting machines, in hydro your plants grow on high beds making harvesting a much more practical process. They grow in clean and easy to wash-off substrate like clay pellets, which eliminates the cost of cleaning and sorting.
Last but most important, in hydroponics you increase the quality and quantity of your yields, as well as their content in active principles, especially when you use the right nutrients.

So in February 2000 we began our tests on Hieracium pilosella, with the understanding that the Faculty in Toulouse would analyze the harvest and give us its conclusions about the quality of our plants compared to soil-grown, and their content in active principles.

We started our Hieracium from seeds in a tray with a mix of perlite and vermiculite. As soon as they became vigorous young seedlings, we transplanted them into a 1 m^2 DPS "Hydro", with a mix of small and medium size rocks for best adherence to the root system. We used Flora-series *** nutrients and set the nutritive solution around EC = 1.0 and pH = 5.8 – 6.2. The plants developed quite well and rapidly increased in size with leaves measuring 10 x 3 cm minimum. In no time they covered the whole area. Maintenance was near to none: just cleaning the dead leaves from time to time.
To respond to the criteria of the analysis we picked part of the plants before flowering and the other after flowering, dried them as requested and sent them to the laboratory.

The results came back quite encouraging. "Batch corresponds to Pharmacopoeia, presenting a high level of tracers (active substances)", was the conclusion of the laboratory's report.
Indeed, the macroscopic and microscopic identifications, as well as the mineral content of our crop, were consistent with the required norms of the soil-grown control.
The dosage showed that the hydroponically grown Hieracium contained 4,24% of active principles compared to 2,5% for the control!

Needless to say that this first analysis boosted our spirits, and opened a large field of investigation and research for us. Once again we had the confirmation that with our technology and our products we could not only increase the volume of production, but we also got the assertion that those products were appropriate for human consumption, and fit to be used for therapeutic applications.

Hypericum perforatum

Our second test was with Hypericum perforatum (or "St John's wort"), a long-living plant, which spontaneously grows in most uncultivated areas. It is called *"perforatum"* because the leaves, when held to the light, show little translucent dots that look as if they were perforated. In reality the dots are not holes, but vesicles of colourless essential plant oils and resin".

Hypericum contains lots of active ingredients with therapeutic virtues, including hypericin and hyperforin. In summer it blooms into bright yellow-orange flowers which petals are peppered with black dots. These dots, when rubbed between the fingers become red. "Many herbalists say that the translucent perforations,

and the black-red dots contain the most active medicinal qualities". (www.hypericum.com)

Hypericum perforatum in an AeroFlo

Hypericum perforatum, is an exceptional plant. In the Middle Ages it was considered as a magical plant, capable to chase malicious spirits away. It was mainly employed to treat nervous diseases. It was used too as "red oil" to cure burns. This consists in macerating the flowers with olive oil in a sunny spot for a few weeks. Once the oil becomes red, it is filtered and kept aside to use on all kinds of burns and bruises **

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Abandoned for a few decades, Hypericum was rediscovered lately thanks to modern research that put into perspective its numerous curative properties. It is today a highly appreciated plant, and you can find it on the shelves of most organic stores and pharmacies worldwide. Hypericum is generally used to treat moderate depression, anxiety and sleep disorder. It seems to have several other virtues and research is still conducted as to the extent of its possible applications. With the rising general interest for the plant, demand is increasing. Hydroponics of course could represent an excellent alternative, but again only if you make sure that your crop satisfies strict therapeutic specifications.

Hypericum perforatum before har vest

In 2002 we started Hypericum perforatum in a row of "Hydro" Dutch Pot System, using Flora-series nutrients. Again plants grew very rapidly and bloomed end of June. We picked the flowers and fruit in the beginning of summer, a few days after the solstice; we dried them, and sent them again to Toulouse.

The results came back as impressing as for the Hieracium pilosella: our harvest was separated in 2 groups, one with only the flowering tops, and one with the fruits. They were compared with a batch of wild Hypericum grown in soil in the region of Toulouse, as a control. The analysis concluded that the hydroponically grown batch entirely complies with the list of requirements of the Pharmacopoeia. The content in total hypericines (the most important active substance in Hyperium perforatum) was higher: O,12% for the soil control, 0,19% for the flowering tops, and 0,13% for the fruits. The minimum required by the Pharmacopoeia being 0,8%, our plants passed the tests brilliantly.

We could now draw our own conclusions: medicinal plants cultivated in a "Hydro" Dutch Pot System, with Flora-series alone, not only fully complied with therapeutic requirements, but also contained more active principles than usual. We had the confirmation that we could grow these products for medicinal purposes and suggest their cultivation to potential customers who would like to start small commercial ventures in a field that is still unexploited. I am not sure how much demand already exists for Hieracium pilosella, but the plant has potential and could be commercially exploited. I know that there is definitely a market for Hypericum perforatum, and there are many more possible candidates to come.

Chrysanthemum partherium

Chrysantehmum partherium and Arnica montana

Of course we didn't stop our research on medicinal plants, quite the opposite. After such encouraging results, we grew "Chrysanthemum parthenium", a beautiful plant which flowers are used against migraines and headaches, and have antispasmodic and revulsive properties. Chrysanthemums were cultivated in an AeroFlo with Flora-series and grew into large plants heavy with huge clusters of white flowers. We/ unfortunately couldn't send them for analysis, so we have no numbers for them.

Arnica montana in an AeroFlo

This year we are growing Arnica montana, another plant which virtues we all know, and which cultivation may help keep in the wild the ones that are still there. Indeed Arnica is becoming another endangered specie due to devastating "in situ" gathering habits. For information, Arnica comes essentially from the Balkans, Romania, Spain and Switzerland. It is protected in Romania, France, Germany and in some parts of Switzerland and there is a specific regulation as to its gathering, in a European directive of 1997. Each year Europeans consume some 50.000 kg of dry flowers, which represents 250 to 300.000 kg of fresh flowers. Plus hundreds of kilos of roots every year. The

selling price for Arnica is relatively high: wholesale is +/- 30 euros a kilo for dried flowers and +/- 60 euros for roots. The Spanish gatherer is paid +/- 5 euros for a kilo of dried matter.

We will communicate the results of our Arnica crop beginning of 2006, after harvest and analysis. For more information on medicinal plants in hydroponics, don't hesitate to contact us at : info@eurohydro.com

IMPORTANT NOTICE

*** Although plants are "natural", they must not be used without the right knowledge or advice. So when you find them on the shelves, and even more if you grow them, make sure to ask for advice before ingesting them, as some of them can be terribly dangerous.*

**** Flora-series is a highly precise formula and an exhaustive nutrient of the best quality, containing everything a plant needs for a perfect development.*