

Peat is used as a horticultural growing substrate for more than fifty years. It has excellent properties such as low PH and low nutrient status. This fact is very significant because growers can apply more nutrients or lime in order to create a substrate proper for each plant demands. Furthermore, peat has great water holding capacity combined with good aeration for respiration of roots, that is why peat substrates do not require precise irrigation schedule. According to data peat use by sector in U.K. is 32% for container nursery stock (280,000 cu m), mushrooms 30%(260,000 cu m)bedding plants 16%(143,000 cu m)and other sectors such as pot plants, vegetable transplants, glasshouse salads and bulbs follow. Smaller amounts of peat are also used for soft fruit and cut flower production.

During the last years there has been an increase concern about the use of peat. Many peat bogs are characterized as special areas of conservation. Number of license for peat extraction has decreased in order to protect environmentally significant peat bogs. Pressure of environmental groups has increased in order to reduce use of peat by growers. Government has set as target that 40% of the total market demands, for growing substrates and soil improvements should not be covered with peat-reduced or peat-free products, by 2004. In 1999 36% of the market was covered by peat alternatives. Some of peat alternatives may include wood residues, forest harvest materials, urban wastes, composts and other industrial wastes.

Scientists have made several experiments to test peat alternative substrates. A team tested the growth of *Viburnum tinus* in peat-based and peat- substitute growing media (Guerin V., Lemaire F., Marfa O., Caceres R., Giuffrida F.2001). *Viburnum tinus* was cultivated to France in ocean climate conditions in three mixtures Finish (1/1) peat/yard compost, (1/1) yard compost/ raw coir and (1/1) Finish peat/raw coir. As a control a mixture of Finish (1/1) peat/pine bark compost was used. In Mediterranean climatic conditions in Spain *Viburnum tinus* was cultivated in (1/1) perlite/composted manure, (1/1) forest compost/composted bark and a (2/3) forest compost /cattle manure. The same control mixture was used. In ocean climate substrates with raw coir or yard compost had similar affect on plant height as the control substrate. In Mediterranean area only the forest compost/cattle manure substrate produced plants with the same height as the control substrate, the other two substrates produced smaller plants. During the experiment other parameters were measured such as dry mass and leaf area. Experimental results showed that alternative

substrates can be used without declass of plant quality, in cases, alternative substrates were more appropriate than the control substrate.

Another research tested the growth and flowering of Geranium and New Guinea impatiens in peat reduced and peat free substrates watered with different irrigation systems, ebb/flow or drip irrigation.(Pozzi A., Frangi P. and Castellnuovo M. 2003). The results showed that coir dust had very good physical properties and could replace peat completely for cultivation of New Guinea impatiens, regardless of the irrigation system. In cultivation of Geranium a percentage of peat is necessary in order to have better growth with subirrigation systems. In the same experiment the use of polyurethane as a substrate was tested, but the results were not satisfactory both for Geranium and New Guinea impatiens.

A very important characteristic of peat is that not many changes occur to it during storage. This fact is very important for a growing media. An experiment which took place in Nottingham Trent University investigated changes in organic growing media during storage (Carlile W.R. 2004). Alternative substrates such as paper and timber waste, bark and wood fires have a high percentage of cellulose and hemicellulose. Due to action of microorganisms structural collapse may occur. Another problem that may appear is the development of moulds or microbial organisms and the utilization of nutrients, especially nitrogen. Coir is another alternative substrate that can be used without these problems. Coir, like peat has a high percentage of lignine, so it is quite resistant to microbial degradation, but in order to use other substrates certain measures should be taken. It is essential to have a very careful composting procedure for materials such as bark and timber by-products. The use of an external nitrogen source could prevent nutritional problems.

Another research that took place in Ireland examined the stability and use of moderately decomposed peat as a structure builder in growing media (Prasad M. and Maher M.J. 2004). It is very important for growing media of long term crops to maintain their structure for as long as possible. In this experiment the shrinkage of four different substrates (three woodfibres and coir) was measured over a period of twenty one months. The results indicated that woodfibres decomposed rapidly but, coir was quite stable. The addition of H5 peat to al the substrates helped them to maintain their stability for a longer period of time, but the addition of lime mede the substrates more vulnerable to structural break down.

Scientists all over the world examine the potential peat alternative substrates and the disadvantages that may have, when compared to peat. Evaluation of water and nutritional consumption is very important for peat alternatives. An experiment tested these parameters by cultivating New Guinea impatiens and Poinsettia in two compost based substrates (Frangi P., D Angelo G. and Castelnuovo M. 2004). The growth of plants was measured in two substrates. The first media contained 50% bark compost and the second contained 50% green waste compost. Both of them were compared to a peat substrate. In the substrates three different levels of nitrogen were applied, 75, 150 and 225 ppm. The amounts of water and fertilizer absorbed by the plants were recorded. Pine bark substrate had similar performance to peat substrate, as far as it concerns physical characteristics, water and fertilizer absorption and plant development. On the other hand, green waste compost substrate had unsatisfactory performance. Because an amount of nitrogen was immobilized by the pine bark compost, plants of poinsettia were taller when further application of nitrogen took place (150 ppm), although the highest level of fertilizer was toxic for New Guinea plants.

The use of peat alternatives is going to expand to many different horticultural sectors. An experiment which took place in Chile tested the use of vegetable waste as a substrate for melon (Del Carmen Salas M. and Urrestarazu M. 2005). The vegetable waste compost was compared to coir and rock wool as far as it concerns yield and quality of melons. The vegetable had satisfactory results only when it was leached prior use, otherwise high PH and salinity occurred.

Since the pressure for adopting new growing media alternative to peat is steadily increased it is almost sure that sooner or later the use of peat alternatives is going to increase. Some super markets have given instructions to the growers that in order to keep buying from them they should limit the use of peat. The reduction of peat use may increase the cost of horticultural production. Coir is a substrate with good characteristics, but it is indigenous to U.K. vegetable composts could replace peat after proper treatments in order to have acceptable pH and salinity. Vegetable composts could be very useful, because they come from recycled materials and is a solution to vegetable waste problem. Another solution could be forestry by-products and furniture waste, but it seems that further research is needed. Probably a first step for the reduction of peat use could be the use of reduced peat growing media. It could be possible to decrease 50% of peat use in a short period of time, but the growers and

consumers should be willing to pay the extra cost. In order to be possible a further decrease of peat in horticulture, further research is required for disease, nutrition and water management and storage characteristics. Finally, further research could take place so as to determine the optimum substrate for each plant.