SUMMARY

The annual global production of biological fibres from cultivated crops is today about 4 billion tons of which roughly 60% comes from agricultural crops and 40% from forests. In comparison, annual world production of steel is currently around 0.7 billion tons and plastic production is about 0.1 billion tons. The annual production of biological fibres in Sweden is about 11 million tons from forestry and very little from agriculture.

The renewed interest in industrial use of plant fibre based materials within industries worldwide has led to development and production of many new natural fibre based products. Several companies in the European, North American and Japanese industry are interested to produce products based on natural fibre raw materials. Most of the fibres that are used come from short wood fibres but some parts come from long plant fibres as jute-, flax- and hemp fibres.

The bio fibre composites show many advantages. They are renewable and biodegradable, CO2 neutral (when burned), lightweight, exhibit good mechanical properties, good acoustic and thermal insulating properties. The raw materials are cheap and abundant. There are also disadvantages of bio fibre composites. One is the prone to water absorption. Most of the plant fibres are hygroscopic and the water absorption may be rather great. The absorption disadvantage may be controlled at an extra cost by different methods of impregnation e.g. heat treatments or chemical modification procedures as acetylation. Another disadvantage is the destructive effect of the alkaline pore solution on plant fibres. There are at least three strategies for controlling the alkaline degradation of fibre cement composites.

Six main fields of applications for military use have been identified, that might be of immediate interest utilizing bio fibre materials. These are:

- Uniforms and other textile applications
- Personal safety equipment
- Transport vehicles
- Field housing and other constructions
- Packaging
- Weapon components and utility tools

“Smart textiles” include technologies such as intelligent fibres, interactive textiles and smart fabrics. Military applications include protective clothing and systems integration in the textile itself. The response of hemp and flax fabric reinforced polypropylene composites under ballistic impact has been investigated. The idea being to create a material for protection against secondary fragmentation from AP mines. In addition to the different composite materials, a steel-composite hybrid system was also tested. With the current generation of biocomposites for military transport vehicles, most applications would be interiors, such as various panels, dashboards and also textiles. The basic advantages would be the same as for the civilian industry. With the next generation of materials, we will also see more external and load bearing components being manufactured. Bast fibre and cellulose fibre based composites would make excellent packaging materials due to their light weight and biodegradability.