Injury Reduction and Performance Enhancement in Silviculture Workers: A Synopsis

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The forestry industry has a reputation for hard physical labour and high injury rates. Some of the most rigorous of these occupations are found in silviculture work. While most of the injuries suffered are not life threatening, WCB costs for tree-planters alone exceeded 1.8 million dollars in 1999. Thus, the purpose of this study is to develop some simple techniques that could be used by silviculture workers to reduce injury rates and to enhance worker productivity.

Sport scientists have studied the process by which the body adapts to exercise in detail over the last 10 years. Techniques have been developed for use by athletes to enhance the ability to execute large amounts of physical activity without injury, to perform the work faster and more efficiently, and to recover faster so that the activity can be sustained repeatedly. This study will apply some of these sports science techniques to silviculture work, in a systematic and controlled fashion.

Several potential key factors have been identified and will be investigated as follows:

1. Control group
   -Change can only be identified as beneficial if the outcome can be compared to what would have happened in the absence of treatment. Perhaps the environmental conditions were better, and the outcome would have improved without the treatment. In the worst case, a treatment might actually decrease productivity, but because the tree-stock was lighter a decrease in injuries might be inaccurately attributed to the treatment.
   -The control group must be identical to the treatment group in every possible way. If at all possible the control and treatment groups should not be aware of which group they are in.

2. Energy Supply
   -The high workload and the duration of the planting day can be compared to ultra-endurance events like the Ironman. In these types of activities the supply of fuel for muscle competes with the supply of fuel for the nervous and immune systems.
   -The ability of the nervous system to function properly can be compromised under these conditions with a decrease in reflex responses, poor mental attitude, and inattentiveness, all of which would lead to decreased productivity and work quality, and increased risk of injury.
   -The activity of the immune system may also be impaired, resulting in a decreased ability to repair minor injuries or traumas, and to ward off infections.
   -In extreme cases the body will cannibalize muscle tissue to provide the nervous and immune systems with fuel. An adequate supply of fuel can prevent muscle wasting during the planting season.
   -The type and combinations of food consumed, and the time of food consumption, are critical for ensuring that the right type of fuel is available to the right body tissue, at the right time, and that recovery occurs from day to day. Correct food and fluid intake are critical for sustained high output activities such as tree-planting, and are one of the fastest ways to improve performance in athletic training and competition performances.
   -The food supplement treatment group will be supplied with a corrected diet. The outcome will be evaluated by measuring injury rate, productivity, fatigue levels, reflex times, changes in body composition, and blood levels of markers for fuels consumed, stress levels, immune activity, and tissue breakdown.

3. Neuromuscular endurance
   -The ability to execute work in an efficient and sustained manner is due in part to the amount of muscle available and the ability of the nerve to call the correct muscles into action, in addition to the fuel supply to the muscles.
   -The strength and flexibility associated with the joint are also important for the ability to execute work without injury. The ligaments and tendons are much less responsive to training, and do not rehabilitate well following injury. The role of the nervous system reflexes in protecting the joint is crucial.
   -Not all training techniques are equally effective but sports science has identified some very effective training methods that produce results with a minimal time commitment.
   -The strength treatment group will be given an exercise program that must be carried out for 6-8 weeks prior to the beginning of the planting season. The program will be designed to produce a good level of strength in the hand, wrist and forearm in a manner that should allow the work of tree planting to be carried out with decreased risk of injury to these areas. The time required for training will be kept to approximately 30 minutes, 5-6 times per week. The outcome will be evaluated by monitoring injury rate, productivity, fatigue levels, reflex times, changes in body composition, and blood levels of markers for stress levels and tissue breakdown.

This study approaches the issue of high injury rates in a physically demanding occupation from an entirely novel perspective. Previously, ergonomic studies have focused on injury rehabilitation, equipment design, and occasionally improved movement efficiency, with equivocal results. In contrast, sports science methods have been proven to greatly increase the capacity for, and recovery from, physical work. This study will use a prophylactic approach, using sport science techniques to prepare tree-planters for a very demanding occupation.

The final aim of the project is to generate practical guidelines that can be used throughout the silviculture industry. Every effort will be made to ensure that these recommendations are realistic and accessible to planters and contractors. The scientific data will be subjected to a peer review process and then published in a research journal, ensuring the validity of study outcomes.