1st International Conference on Chainsaw Safety in Forest Harvesting

ForSaf 2024

Book of Abstracts

CHAINSAW SAFETY: HOW CAN WE IMPROVE THE SAFETY CULTURE IN FOREST HARVESTING?

2 December, 2024,
Zagreb, Croatia

CTFC

UNIVERSITY OF LJUBLJANA BF Biotechnical Faculty

HRZZ Croatian Science Foundation

Agency for Vocational Education and Training and Adult Education

Croatian Chamber of Forest and Wood Technology Engineers

CHAINSAW SAFETY: HOW CAN WE IMPROVE THE SAFETY CULTURE IN FOREST HARVESTING?

BOOK OF ABSTRACTS

December 2, 2024

Zagreb, Croatia

Publication title:	I. International Conference on Chainsaw Safety in Forest Harvesting - Chainsaw Safety: How Can We Improve the Safety Culture in Forest Harvesting?, Book of Abstracts
Published and issued by:	Faculty of Forestry and Wood Technology of the University of Zagreb, Department of Forest Engineering
For the publisher and issuer:	Prof. Josip Margaletić, the Dean of Faculty of Forestry and Wood Technology of the University of Zagre
Editor:	Assoc. Prof. Matija Landekić
Organizer:	Faculty of Forestry and Wood Technology of the University of Zagre (FŠDT)
Co- organizers:	Forest Science and Technology Centre of Catalonia (CTFC) Biotechnical Faculty, University of Ljubljana (BFLJ) Croatian Science Foundation (CSF) Agency of Vocational Education and Training and Adult Education (ASOO) Croatian Chamber of Forest and Wood Technology Engineers (HKIŠDT)
Place and time of conference:	Zagreb, 2 December 2024
Graphic design and printing:	Nensi-TIM trade for printing, publishing and marketing
Number of copies printed:	50

ISBN: 978-953-292-088-8

The CIP record is available in the computer catalog of the National and University Library in Zagreb under number 001247918.

Conference chair:	Matija Landekić, FŠDT, Croatia
Organization committee chair:	Matija Landekić, FŠDT, Croatia
Members of the organization committee:	Josip Margaletić, FŠDT, Croatia Stjepan Posavec, FŠDT, Croatia Zdravko Pandur, FŠDT, Croatia Matija Bakarić, FŠDT, Croatia Marin Bačić, FŠDT, Croatia Rosa M. Ricart, CTFC, Spain Anton Poje, BFLJ, Slovenia Sandra Vujnović, ASOO, Croatia Silvija Zec, HKIŠDT, Croatia
International scientific committee chair:	Mario Šporčić, FŠDT, Croatia
Members of the international scientific committee	Andreja Đuka, FŠDT, Croatia Dinko Vusić, FŠDT, Croatia Ivan Martinić, FŠDT, Croatia Marijan Šušnjar, FŠDT, Croatia Janez Krč, BFLJ, Slovenia Igor Potočnik, BFLJ, Slovenia Adriano Raddi, CTFC, Spain Carles Lorca, CTFC, Spain Jusuf Musić, FF, FB&H Velid Halilović, FF, FB&H;

Conference program

8.00 – 9.00	Arrival and registration
9.00 – 9.30	**Conference opening** • **Stjepan Posavec**, Vice Dean of the FŠDT • **Matija Landekić**, HRZZ Project Manager
9.30 – 11.00	**Session 1:** Forestry Training Programs *Session chair: Šporčić M.*

Rosa M. Ricart

The EFESC - European Forestry and Environmental Skills Council in Spain (2009-2024): Harnessing a Methodology for the Professionalisation of the Forest-Based Sector

Rosa M. Ricart

Bringing the Best to Forestry Training Centres: The EFT Quality Scorecard

Sandra Vujnović

The Education Program for the Acquisition of Micro-qualifications in Handling Chainsaws in Forestry and the Documents on which it is Based

Matija Bakarić, Matija Landekić, Ivan Martinić, Mario Šporčić, Anton Poje, Rosa M. Ricart

Analysis of the Training Programs for Chainsaw Workers: Comparison of Slovenia, Spain and Croatia

11.00 – 11.30	Coffee break
11.30 – 13.00	**Session 2:** Work Safety at Tree Felling *Session chair: Šušnjar M.*

Anton Poje, Luka Pajek

Stumps as a Mirror of the Tree Felling Process

	Jusuf Musić, Jelena Knežević, Velid Halilović, Ehlimana Pamić *Analysis of Safety at Work in Forestry of the Federation B&H* **Zdenko Tomašić** *Training Workers to Work in a Safe Manner at Tree Felling and Processing Activities: A Case Study of the Company Hrvatske šume Ltd.* **Silva Perakić** *Analysis of Injuries Occurred During the Restoration of Forest Stands Affected by Storm in the Company Hrvatske šume Ltd.*
13.00 – 14.00	Lunch
14.00 – 15.30	**Session 3:** Occupational Safety and Science *Session chair: Pandur Z.*
	Snježana Kirin, Marko Ožura, Marinela Vulić *Investigations of the Workload of Forestry Workers using the PLIBET Method* **Marin Bačić, Zdravko Pandur, Marijan Šušnjar, Anton Poje, Luka Pajek** *Hand-Arm Vibration Exposure Mitigation: Relevant Measures* **Josipa Nakić, Matija Landekić** *Manual Handling Technique During the Work of a Chainsaw Operator* **Matija Landekić, Matija Bakarić, Marin Bačić, Zdravko Pandur, Ivan Martinić, Mario Šporčić** *Upgrade Proposal of the National Chainsaw Operators` Training Program: A Croatian Case Study*
15.30 – 16.00	**Conference closing** *Session chairs: Landekić M., Martinić I.*

Content

Preface

Dear participants of the international conference,

Regarding the completion of the Croatian Science Foundation project entitled "Increasing the Competitiveness of Forestry Sector through Development of Safety Culture - ForSaf2024" you are currently witnessing and taking part in the 1st International Conference on Chainsaw Safety in Forest Harvesting.

As is well known, the rate of injury at work in forestry is significantly higher than in other sectors, which places this profession in the category of the high-risk sector. Additionally, the world of labour today is marked by the lack of interest in the so-called 3D "black collar" jobs that imply physically demanding, dangerous and dirty jobs. In forestry production such occupations certainly involve tree fellers, choker-men and skidder drivers. This inevitably leads to a significant reduction in labour market potential and the lack of workforce in the forestry sector. On the other hand, the demand for wood raw material is growing, contributed by the transition of the fossil economy to bio-economics where forestry sector has one of the leading roles.

Within the four-year project in question, with its general and specific goals, the research group, through the proposed educational, legislative and technical measures based on scientific evidence, contribute to improving sector competitiveness by assuming the role of a, hopefully, long-term economic and social development driver, especially in the segment of connecting scientific organizations with the economy and society.

The process of training and certification of forestry workers, for specialized and high-risk jobs, in the form of adopted knowledge, skills and safety measures at work should be the basis for the development of a proactive safety culture in every national forestry sector. The fundamental mission of the subject scientific conference is international networking with organizations and experts, all with the aim of exchanging good practices, innovative approaches and the latest achievements in the field of training and safety at tree felling operations. The second objective includes the presentation of key results of the scientific project and the promotion of the proposed "differentiated" national program for chainsaw operators training in forestry, where the proposed should be a next step towards a high level of expertise and safety at work in the Croatian forestry sector.

At the end of the opening remarks, with gratitude to everyone who contributed to the organization and hosting of the international scientific conference on chainsaw safety in forest harvesting, I greet you warmly!

Assoc. Prof. Matija Landekić

Faculty of Forestry and Wood Technology of the University of Zagreb
Department of Forest Engineering

The EFESC - European Forestry and Environmental Skills Council in Spain (2009-2024): Harnessing a Methodology for the Professionalisation of the Forest-Based Sector

Rosa M. Ricart[1]

[1]Forest Science and Technology Centre of Catalonia (CTFC), EFESC National Agency, Crta. De St. Llorenc de Morunys, km 2, (direc. Port del Comte), 25280 Solsona, rosa.ricart@ctfc.es

Abstract

In Spain, companies and training centres have difficulties to find workers with all the necessary skills. These jobs are undervalued, very demanding and dangerous in remote areas with few services. The fundamental question that is asked is: How can we all empower the sector, professionalise it, improve its safety, promote the health of workers, facilitate their mobility across the EU, promote the incorporation of young people and women into the sector?

Forest Science and Technology Centre of Catalonia (CTFC) together with 4 other entities of an EU Leonardo project established in 2009 a certification organisation: the European Forestry and Environmental Skills Council (EFESC). A set of standards that contribute to professionalisation and to the improvement of safety, health and mobility, due to the interchangeability of the certificates were defined. All started by creating a structure with a General Assembly, 3 expert committees (the Executive/ the Standards / the Accreditation) and

a National Agency in each country. The standards committee draws up the regulation(s) and qualification(s), tests them in each country and discusses them, and then they are approved in the framework of the General Assembly. Finally, a period of implementation in each country and updates/adjustments at European level begins.

Main results so far are (a) 4 certifications: the European Chainsaw Certificate with its five different levels (ECC), the European Brushcutter certificate (EBC), the European Machine Operators Certificate (EMOC) and the Cork Debarker Certificate (CPS); (b) more than 2.500 certificates in Spain (more than 25.000 in EU); (c) more than 1700 holders in Spain (more than 14.000 in EU); (d) 12 assessment centres in Spain (65 in EU) and 20 assessors (113 in EU of which two women); (e) certificates recognised and accepted by the sector. For instance: in the collective agreement for forestry work in Catalonia and in forestry calls for tenders; (f) ECC has been included in the National Catalogue of training specialities in Spain, *Servicio Público de Empleo Estatal* (SEPE); (g) assessment of these certifications included in formal and non-formal trainings; (h) the Occupational Safety and Health Agency (EU-OSHA), OSHA published a policy brief in March 2021 highlighting that chainsaw work still constitutes "the most significant risk in forestry". EFESC and its European Chainsaw Certificate, however, are mentioned as a good example for addressing this persistent risk though better and standardised qualification.

In the next period it is essential to continue training and professionalising people in the sector to avoid a shortage of skilled labour and to work towards the complete structuring and

digitalisation of the forestry sector. The proposed capacity-building methodology aims to help to achieve the vision and the main objectives set out in the Spanish Horizon 2050 Forestry Strategy of ensuring that there are properly managed forests and forest systems in Spain, i.e. that they are well conserved, more resilient to climate change, protected from the main threats (forest abandonment, fires, diseases and pests) and that they provide the ecosystem goods and services necessary for our well-being and to enable the economy to begin a necessary ecological transition.

Keywords: capacity-building, certification, European qualification, learning outcomes, knowledge, skills, responsibility and autonomy, competence, validation of non-formal and informal learning/training, formal recognition of learning outcomes

Bringing the Best to Forestry Training Centres: The EFT Quality Scorecard

Rosa M. Ricart[1]

[1]Forest Science and Technology Centre of Catalonia (CTFC), EFESC National Agency, Crta. De St. Llorenc de Morunys, km 2, (direc. Port del Comte), 25280 Solsona, rosa.ricart@ctfc.es

Abstract

The EFT Quality Scorecard is a self-evaluation and improvement tool created to improve the quality of forestry training and to provide guarantees of the level of excellence of Forestry and Tree-care VET Centers. This tool, based on standardized requirements, has been developed by members of the EU Erasmus+ funded Elite Forest Training project (EFT), enable forestry VET centres to identify their strengths and weaknesses through various parameters that are defined and described in the operational tool.

To launch the scorecard, the EFT project has: (a) taken stock of European forestry training best practices, compiled in the 'Inventory of Good Practices of Forestry Training Centres in Europe'; (b) built the 'Quality Standard for Forestry & Tree Care VET Centres'. This Standard has been developed as the normative framework for the self-evaluation and continuous improvement of European Forestry VET Centres, permitting quality appreciation. It is therefore a common European reference framework for assessing Forestry and Tree Care training practices, with the aim of improving the quality of both the VET Centres and training delivery. Additionally, to the identified best

practices, substantive Forestry VET Centres' national and international standards, guidelines, and processes have been incorporated. It establishes requirements that consider both national and international regulations and considers the local specificities of forest management and vocational education and training.

Throughout the development process of this standard, various quality criteria have been identified. Given the broad range of application areas, including management, resources, safety, education, cooperation, inclusion, and the environment, specific goals were determined to support continuous improvement, with the final objective of achieving excellence. Furthermore, during this process, common methods and tools that can be used by all countries to evaluate and enhance their practices have been identified. Designed to be served as a scorecard, it is envisaged that this Standard could serve as the foundation for a certification scheme guaranteeing the excellence of Forestry and Tree Care VET Centres. Standard is structured according to the following structure: (a) Aspect: Category of condition or process against which Forestry and Tree Care VET Centres can be evaluated; (b) Criterion: A set of conditions or processes that determine the quality of Forestry and Tree Care VET Centres according to the different quality aspects defined in this standard. Each criterion is defined in general terms and implies different specific goals, (c) Specific goal: A condition or process that describes how the implementation of quality improvements in Forestry and Tree Care VET Centres can be evaluated in an objective and unambiguous way. These specific goals are directly or indirectly related to quantitative or descriptive indicators.

Within the self-evaluation scorecard the Specific Goals will be measured based on indicators that are: quantitative, descriptive, or mixed parameters that are periodically monitored to reflect the direction in which conditions change. These indicators provide an accurate and unambiguous description of the content of a specific goal and can be derived either directly from available data or indirectly from existing information. The EFT Inventory of Forestry Good Practices, the Quality Standard and the Quality scorecard are available at https://eliteforesttraining.eu/project-results/

Keywords: forestry training centres, good practices, self-evaluation tool, quality standard, quality scorecard, Europe level

The Education Program for the Acquisition of Micro-qualifications in Handling Chainsaws in Forestry and the Documents on which it is Based

Sandra Vujnović[1]

[1]Agency for Vocational Education and Training and Adult Education Agency for Vocational Education and Training and Adult Education, Department for Green and Creative Industries, Garićgradska 18, 10 000 Zagreb, sandra.vujnovic@asoo.hr

Abstract

All programs implemented by adult education institutions in Croatia must be written in accordance with the new Methodology developed by the Agency for Vocational Education and Training and Adult Education from January 2025 - Methodology for adult education programs for the acquisition of micro-qualifications, partial qualifications and full qualifications financed through vouchers and other sources of financing. The Methodology for adult education programs is in accordance with the Act on Adult Education (NN 144/2021), the Act on the Croatian Qualifications Framework (NN 22/13, 41/16, 64/18, 47/20, 20/21) and the Rulebook on the Register of the Croatian Qualifications Framework (NN 96/2021). Micro-qualification is an education program for acquiring and evaluating units of learning outcomes. To date, the Agency for Vocational Education and Training and Adult Education and adult education institutions have developed over 400 micro-qualification programs from various sectors. One of these programs is the Education Program for the acquisition of

micro-qualifications in handling chainsaws in forestry from the Forestry and wood technology sector. The education program for the acquisition of micro-qualifications in handling chainsaws in forestry lasts 175 hours and includes three units of learning outcomes: Safety at work in forestry; Chainsaws in forestry and Techniques of working with a chainsaw when felling trees and processing wood assortments.

After the successful completion of the education program, a Certificate of Training is issued, which is entered into the e-work book. The attainment of micro-qualifications is being financed through vouchers from April 2022.

Keywords: Croatia, forestry micro-qualifications, chainsaw, adult education; units of learning outcomes

Analysis of the Training Programs for Chainsaw Workers: Comparison of Slovenia, Spain and Croatia

Matija Bakarić[1], Matija Landekić[1], Ivan Martinić[1], Mario Šporčić[1], Anton Poje[2], Rosa M. Ricart[3]

[1] Faculty of Forestry and Wood Technology, University of Zagreb, Department of Forest Engineering, Svetošimunska c. 23, HR – 10 000 Zagreb, Croatia, e-mail: mbakaric@sumfak.unizg.hr

[2] University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Jamnikarjeva 101, SLO – 1000 Ljubljana, Slovenia, e-mail: Anton.Poje@bf.uni-lj.si

[3]Forest Science and Technology Centre of Catalonia (CTFC), EFESC National Agency, Crta. De St. Llorenc de Morunys, km 2, (direc. Port del Comte), 25280 Solsona, rosa.ricart@ctfc.es

Abstract

Work in operational forestry ranks among the most dangerous occupations with huge human and financial losses, and forestry profession is one of most dangerous of all production occupations. Rate of injuries in forestry is significantly higher than in other sectors, which puts this profession in category of high-risk sectors. The aim of the research is to study and compare the training programs in Slovenia, Spain and Croatia, and propose guidelines for the improvement of the existing model of chainsaw workers training in the Republic of Croatia.

Regarding the state of training in the investigated countries, information was collected using a questionnaire during the year 2024. Questionnaire is structured in two sections: Legal framework (collect information about the legal framework and

conditions related to the organization of training for forestry operations) and Thematic framework (focused on collecting information about the topics, hours, examination process and related certificates). In total, there are 15 questions to be answered. First part includes rate of injuries in forest sector, legislation, institutions and organizations that operate in the field of forest workers training are presented. To get a better idea of the current situation, number of institutions that conduct training is considered, including a numerical representation per individual state, the competences of state institutions, the minimum requirements for applicants and the legislative package for the theoretical and practical part of training. The second part of the questionnaire shows the types of forestry work for which applicants can be trained, the form of taking the exam, the validity period of the training, what is the position of non-professionals, etc.

In conclusion, through the review of all 15 questions, propose guidelines for the improvement of the existing model of chainsaw workers training through a certification system in Croatia is considered.

Keywords: forest worker, vocational training, laws and legal documents, training organizations

Stumps as a Mirror of the Tree Felling Process

Anton Poje[1], Luka Pajek[1]

[1] University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Jamnikarjeva 101, SLO – 1000 Ljubljana, Slovenia, e-mail: Anton.Poje@bf.uni-lj.si

Abstract

The prescribed working procedure must be followed to ensure work safety, which is reflected in the dimensions of the safety elements. The dimensions of the elements can be determined based on the marks left on the tree stump by felling. The aim of the study was to find out how the fellers comply with the prescribed working procedures when felling a tree. According to the prescribed safe working procedures, the notch angle should be between 35° and 45°, the width of the hinge and the height of the undercut should be at least 1/10 of the diameter of the stump and the notch depth should not exceed1/3 of the diameter of the stump. 128 stumps of conifers (34%) and deciduous trees (66%) felled by 25 professional fellers were included in the study. With the exception of one worker who felled 8 trees, each worker felled 5 trees. The results showed that the notch angle was too low in 16% of the cases, being significantly lower in deciduous trees and differing significantly between the fellers. The notch depth was too large in 63 % of cases, whereby it was significantly greater in deciduous trees and differed significantly between the fellers. The hinge was correctly executed in 32 % of all cases. In 39% of cases, the hinge was missing or incorrectly executed (on one side); of the correctly executed hinges (continuous or interrupted in the middle), 47 % were too thin. Only two fellers made the hinges

correctly on all trees. The height of the undercut was too low in 70% of cases and differed significantly between the fellers. The results of the survey show that prescribed working procedures are very often violated when felling trees, which potentially increases the risk of accidents. On the other hand, the results show that continuous training and professional work supervision are required.

Keywords: forestry, safety at work, felling, stumps

Analysis of Workplace Safety in Forestry of the Federation B&H

Jusuf Musić[1], Jelena Knežević[1], Velid Halilović[1], Ehlimana Pamić[1]

[1]University of Sarajevo, Faculty of Forestry, Zagrebačka 20, FB&H, j.music@sfsa.unsa.ba

Abstract

Despite the significant improvement in occupational safety, which has generally been achieved in the past decades, forestry still represents one of the most dangerous economic branches. Most of the work operations in forestry production are high-risk, and the worker is exposed to dangers arising from the condition and characteristics of the workplace, the handling of the work object and the use of working tools. The principle of an integral approach to safety at work, promoted by the International Labor Organization (ILO), according to which the safety and health of workers are integral elements of the company's goal and the general quality of business, unfortunately, is mostly absent in FBiH forestry. At a time when the health and safety of workers are set as the highest priorities in forest management, it is necessary to pay adequate attention to this problem. Hence the basic motive for the creation of this study, the aim of which is a comprehensive analysis of injuries at work in FBiH forestry. The state of safety during forest work in six forestry companies, which realize about 80% of the felling volume in FBiH, was analyzed. The analysis included 12 different indicators, and the most significant results are as follows: a) the average number of injuries was 287/mil.m^3 or 51 injuries/1000 employees, and the number of deaths was 1.52/mil.m^3; b) the most injuries occurred to the direct executors of wood harvesting operations (63.51%), and

the most risky profession is feller (45.38%); c) workers' extremities were most often injured (68.35%), and the object of work (trees and branches) were the most common material cause of injuries (43.87%), d) the largest number of injuries suffered resulted in sick leave longer than 30 days. Although, based on the presented results, the state of safety at work can be assessed as extremely unsatisfactory, this problem is practically ignored in regular reports on the operations of forestry companies. In addition to the need to improve general and special regulations and a broader professional and public discussion about the importance of this issue, as one of the solutions that will, among other things, improve the state of safety in forest work in a relatively short time, a greater application of modern technologies in the technological process of wood harvesting is imposed.

Keywords: Federation B&H, workplace injuries, forestry, forest harvesting, workplace safety

Training Workers to Work in a Safe Manner at Tree Felling and Processing Activities: A Case Study of the Company Hrvatske šume Ltd.

Zdenko Tomašić[1]

[1] Head of the Occupational Safety Service, Hrvatske šume Ltd., Ulica kneza Branimira 1, HR-10 000 Zagreb, Croatia e-mail: zdenko.tomasic@hrsume.hr

Abstract

As one of the key measures for improving workplace safety and preventing work-related injuries, occupational diseases and work-related illnesses in the company Hrvatske šume Ltd., chainsaw workers are being trained to work in a safe manner. The obligation for the safe working practice training derives from the provisions of Article 27 of the Occupational Safety and Health Act (Official Gazette 71/14, 118/14, 94/18, 96/18), and the training itself is carried out according to the conditions and in the manner defined by the Ordinance on training and further training in occupational safety and passing a professional exam (Official Gazette 142/21).

Training is carried out based on a risk assessment, according to the plan and program of training for safe work in felling and processing trees, which is an integral part of the internal Ordinance on occupational safety in Hrvatski šume Ltd. The training consists of a theoretical and practical part, and includes all hazards, harms and efforts determined by risk assessment, as well as ways of applying the principles of prevention and rules of

occupational safety in relation to the risks present. Theoretical training is carried out by a combined method of lectures by an occupational safety expert and self-education of workers through educational literature and instructions/manuals. Practical training is carried out by demonstrating the correct working technique and work under the supervision of a trained chainsaw worker at the forest working site.

The qualification check for the theoretical part is carried out by an occupational safety expert by means of a written test. The test of practical skills is carried out by performing working operations in concrete field conditions, where the trainee independently, at a forest working site, performs work regarding felling and processing trees, which includes felling a standing tree, processing and cutting branches, and cross cutting into wood assortments.

The final qualification assessment, which can be the worker is trained or the worker is not trained to work in a safe manner for the tasks and activities to be performed, is made by an occupational safety expert who participates in the training process and the worker's immediate supervisor. A record of the final evaluation of the training is drawn up on the company's prescribed form (ZOS Form), the content of which is defined by the competent Ordinance (Official Gazette 142/21).

Keywords: chainsaw worker, safe working practice training, risk assessment, working technique, final qualification assessment

Analysis of Injuries Occurred During the Restoration of Forest Stands Affected by Storm in the Company Hrvatske šume Ltd.

Silva Perakić[1]

[1] Expert Associate of Occupational Safety, Forest Administration Vinkovci, Hrvatske šume Ltd., Trg bana Josipa Šokčevića 20, HR-32100 Vinkovci, Croatia, email: silva.perakic@hrsume.hr

Abstract

The risks involved in forest work are numerous, and the working environment, which includes working outdoors, is fraught with numerous dangers. At the same time, restoration works in forest stands damaged by natural disasters, such as wind, snow or ice, means working in conditions of increased risk for production workers. As part of the presentation, an analysis of the injuries that occurred during the one-year restoration activities of forest stands is presented, and consequently it is related to the storm that hit continental Croatia on July 19, 2023, and thus the Forest Administration Vinkovci causing enormous material damage. After the occurrence of the event, the company Hrvatske šume Ltd., which manages state forests in the Republic of Croatia, got involved in restoring the damage with its own human and machine resources. In addition to the valid Instructions for working in a safe manner when felling and processing trees, issued by Hrvatske šuma Ltd. in 2009, before proceeding with the restoration of forest stands, special written and practical instructions were issued in which the techniques and technology of work in the newly created situation were clarified.

At the working sites of FA Vinkovci in the period from July 20, 2023 to July 19, 2024, a total of 44 injuries with 1,334 lost working days were recorded, of which 42 injuries were of a minor nature (27 during felling and processing, 2 during silviculture, 2 during skidding and 11 injuries during other works) and 2 injuries of a more serious nature during felling and processing of trees. For comparison, in the period from July 20, 2022 to July 19, 2023, a total of 24 injuries with 753 lost working days were recorded, of which 20 injuries were of a minor nature (9 in tree felling and processing, 3 in silviculture, 2 in skidding and 6 injuries on other works) and 4 injuries of a more serious nature (3 in tree felling and processing and 1 on other works). In the period from July 20, 2023 to July 19, 2024, 22 injuries were categorized under code 812, i.e. malfunctioning, slippery and blocked passages and surfaces where work is being performed, and in the period from July 20, 2022 to July 19, 2023. out of 24 total injuries 5 were categorized under code 812. The analysis of injuries shows an increase in the number of minor injuries at work, especially in tree felling and processing operations, while the number of serious injuries is lower than in the previous year.

Keywords: forestry, chainsaw worker, working injuries; natural disasters caused by wind, restoration of forest stands

Investigations of the Workload of Forestry Workers using the PLIBET Method

Snježana Kirin[1], Marko Ožura[1], Marinela Vulić[1]

[1] Karlovac University of Applied Sciences, Department of Safety and Protection, Trg J.J. Strossmayera 9, HR - 47000 Karlovac, Croatia, e-mail: snjezana.kirin@vuka.hr

Abstract

Work in forestry is a high-risk work process, in addition to the factors of the work environment, the way of carrying out the work operations itself is a danger. The PLIBEL method was used in the paper to analyze the workload of workers in forestry at five different jobs (tractor operator, clipper, receiver, cutter and truck driver). The analysis of the obtained data revealed a high workload of the workers due to the nature of the work operations and the work environment. Applying correct and safe work techniques with the use of personal protective equipment and good work organization reduces workload and increases work productivity.

Keywords: forestry, PLIBEL method, workload

Hand-Arm Vibration Exposure Mitigation: Relevant Measures

Marin Bačić[1], Zdravko Pandur[1], Marijan Šušnjar[1], Anton Poje[2], Luka Pajek[2]

[1] Faculty of Forestry and Wood Technology, University of Zagreb, Department of Forest Engineering, Svetošimunska c. 23, HR – 10 000 Zagreb, Croatia, e-mail: mbacic1@sumfak.unizg.hr

[2] University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Jamnikarjeva 101, SLO – 1000 Ljubljana, Slovenia, e-mail: Anton.Poje@bf.uni-lj.si

Abstract

Hand-arm vibration in forest operations is, in most cases, induced by a chainsaw. Since vibration exposure is a health issue, different organizations propose various ways to mitigate it. The measures can generally be divided into those that reduce the exposure time and vibration magnitude, and those that hinder the transfer of vibrations. Reducing the exposure time is the most common measure to implement and it is rooted in several practical and legally binding measures such as job rotation, switching hands while carrying an idling chainsaw, time to reach A(8) exposure limit value, and the actual time restriction of 4 to 5 hours of chainsaw work per day. Reduction of vibration magnitude can be achieved with regular chainsaw maintenance including chain sharpening, using less powerful or battery chainsaws that vibrate less, if applicable, and various technical solutions.

Hindrance of vibration transfer to the hands of the operator is accomplished through suspended handles of the chainsaw (anti-vibration system), anti-vibration gloves, and conscious regulation of the hand-handle coupling force. In some instances, proposed practical measures can help mitigate vibration exposure by reducing both the magnitude and exposure time, like using battery chainsaws. This study aims to compile and analyze all relevant measures proposed by health and safety organizations, including various legislative measures.

Keywords: forestry; hand-arm vibration; vibration exposure; chainsaw; mitigating measures

Manual Handling Technique During the Work of a Chainsaw Operator

Josipa Nakić[1], Matija Landekić[2]

[1] Faculty of Kinesiology, University of Zagreb, Horvaćanski zavoj 15, 10000 Zagreb, Croatia, josipa.nakic@kif.unizg.hr

[2] Faculty of Forestry and Wood Technology, University of Zagreb, Department of Forest Engineering, Svetošimunska c. 23, HR – 10 000 Zagreb, Croatia, e-mail: mlandekic@sumfak.unizg.hr

Abstract

The working tasks of chainsaw operators are physically extremely demanding. The prevalence of symptoms of musculoskeletal disorders (MSDs) in chainsaw workers, particularly in the lower back, ranges from 38% to almost 71%. Manual handling techniques in the occupation of chainsaw workers play a significant role in the occurrence and/or prevention of MSDs. The stoop lift, a technique for handling loads that involves pronounced flexion of the spine, is the most common incorrect movement pattern in the job of chainsaw workers. This improper manual handling technique directly contributes to the occurrence of musculoskeletal disorders (MSDs) not only in the lower back but also in other parts of the body. Within the framework of research results the hip hinge technique is presented as a crucial mechanism for maintaining the health of the locomotor system in chainsaw workers. Every forward torso tilt during various working elements/tasks such as cleaning the working environment, starting the chainsaw, making different cuts, processing wood, etc. is shown through ergonomically recognized hip hinge technique, specifically using a load handling technique known as

the Romanian deadlift. Conclusively, without adopting and automating the hip hinge, it is very difficult to maintain the functionality of the spine and the working capacity of chainsaw operators. Workers must be educated and trained (qualified) to work safely with respect to statodynamic workloads and manual handling techniques.

Keywords: forestry, chainsaw worker, statodynamic workloads, stoop lift, hip hinge, musculoskeletal disorders, prevention.

Modification Proposal of the National Chainsaw Operators` Training Program: A Croatian Case Study

Matija Landekić[1], Ivan Martinić[1], Matija Bakarić[1], Marin Bačić[1], Zdravko Pandur[1], Marijan Šušnjar[1], Mario Šporčić[1]

[1] Faculty of Forestry and Wood Technology of the University of Zagreb, Department of Forest Engineering, Svetošimunska c. 23, HR – 10 000 Zagreb, Croatia, e-mail: mlandekic@sumfak.unizg.hr

Abstract

The globally present frequency of injuries at work and serious injuries with fatal outcome in the forestry industry, especially in motor-manual tasks with chainsaw, remains the main priority in the process of developing a safety culture. The lack of unified training in numerous countries has been identified as a fundamental problem in achieving a satisfactory level of occupational safety among forest chainsaw operators. As part of the new green European strategy, quality professional training must be a basic prerequisite of modern forestry in building and maintaining a preventive culture and to protect workers' health. The valid national micro-qualifications for chainsaw operators and the international European Chainsaw Certificate were analysed and evaluated through 6 defined structural elements and 4 defined general elements. A modification proposal of the national chainsaw operators` training program for the Republic of Croatia was made based on previous analysis. Improvement of safety level in forestry within the newly proposed model is presented through "differentiated" national approach regarding

training professional and non-professional chainsaw users. The fundamental mission of the newly chainsaw training program, through defined learning outcomes and acquired competencies, is to ensure high quality qualifications, improve safety standards and ensure mobility and employment opportunities of chainsaw operators within EU member states, but also more widely.

Keywords: forestry, work safety, chainsaw, training program, Croatia

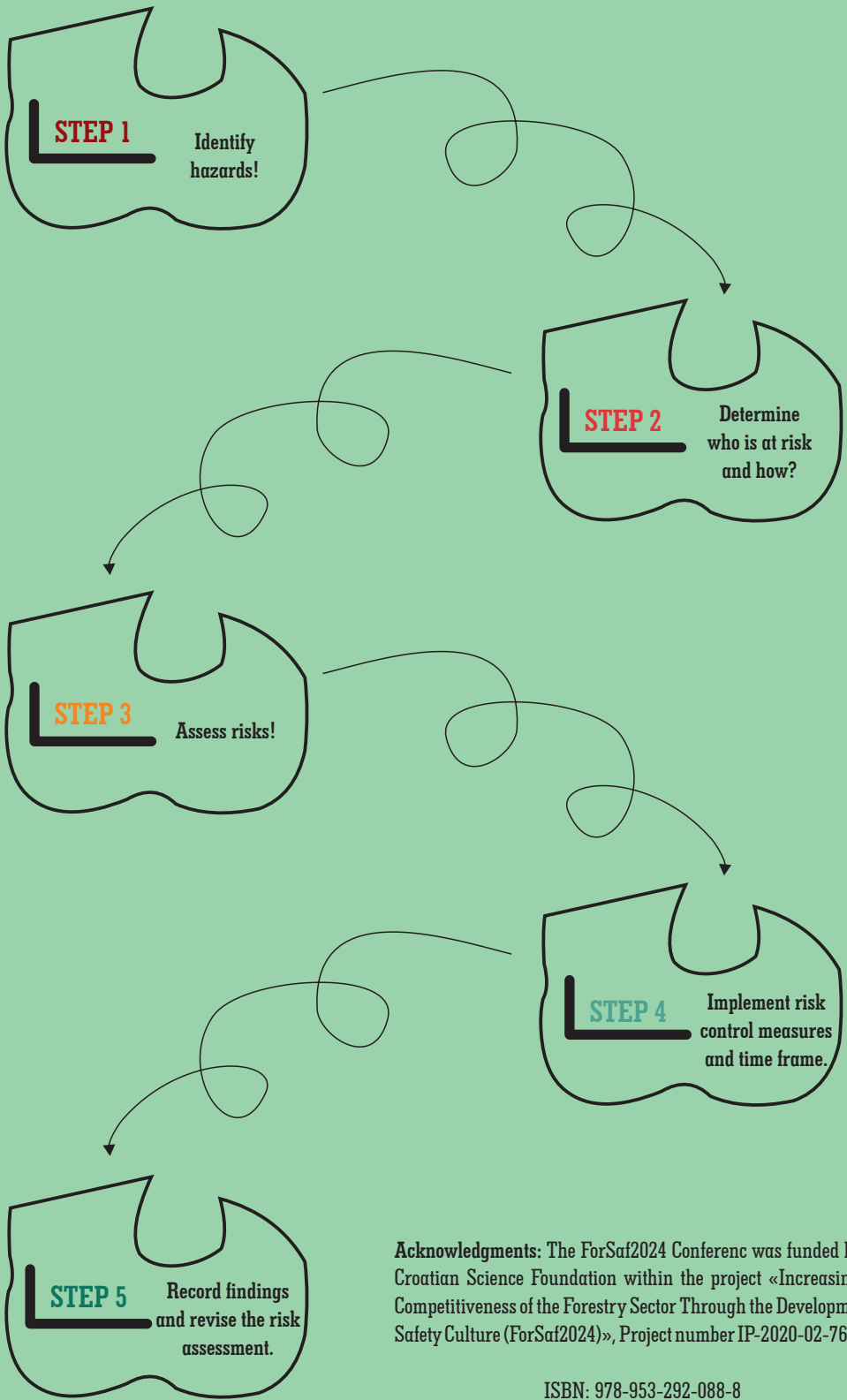
Notes

Notes

Notes

Notes

Notes



Acknowledgments: The ForSaf2024 Conferenc was funded by the Croatian Science Foundation within the project «Increasing the Competitiveness of the Forestry Sector Through the Development of Safety Culture (ForSaf2024)», Project number IP-2020-02-7637.

ISBN: 978-953-292-088-8