

## EDUCATION OF FOREST WORKERS IN BULGARIA

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### Abstract

The education of forest workers in Bulgaria has its traditions and a long history. It suffered a decline in the nineties, but enjoyed recently a revival. The mobile form of education was adopted. New education programs for chain saws, skidders, sky lines, cranes and log band-saws were developed. In this paper, the knowledge of Bulgarian workers before and after an education course is investigated along with specific problems such as the use of professional work wear and the compliance with safety rules, etc. Problems due to working conditions, the condition of machinery and the mentality are considered. The indispensability of the standardization and certification of forest worker education in the EU is pointed out.

**Key words:** education, forest workers, history

### INTRODUCTION

Bulgaria is a small country with an area of 111 000 km<sup>2</sup>, located on the Balkan peninsula at the southern border of the EU (joined in 2007). Its forest cover equals the EU average - about one third of the total land area. Lately, the annual increment of Bulgarian forest (named once *Magna Silva Bulgarica* by crusaders) is around 14 mill m<sup>3</sup> and the annual cut is 7 mill m<sup>3</sup>, respectively, which means that, in forest policy, the ecologic principle predominates over the economic principle. We believe that, in order to mobilise the available resources, a new start is required for the logging sector, i.e. the re-equipment of the sector with new machines and technologies and, last but not least, the improvement of the education of the forestry engineers as well as the forest workers are necessary.

### MATERIALS AND METHODS

The problem's history was traced based on publications. The present day situation was stated by study of official data and by inquiries. Our every day experience and the informal contacts with experts, workers and businessmen were also taken into consideration.

## RESULTS

### **Brief history**

The education of forest workers in Bulgaria dates back around a century and a half. Historically, education was related to the development of forestry sector. During the last century, four periods can be distinguished in this development:

The period 1878 to 1950. Until this period, logging in Bulgaria was primitive. About 1.6 mill m<sup>3</sup> were harvested annually, mainly hardwood for heating (firewood) and some construction timber, mostly from conifers. Cutting and primary processing were conducted manually with axes and manual two-man saws and felling using wooden wedges. Piled wood was hauled on horse saddles, and logs were hauled by oxen using a chain with or without an attached wooden runner (a type of sled below the butt ends of the log to reduce friction). In this period, there was no forest worker education. Usually, novices learnt informally from elder and experienced workers.

The period 1950 to 1970. In this period of the post-war industrialisation, the consumption of wood increased due to the intensive development of house construction, wood processing, the cellulose industry and agriculture. The annual cut nearly doubled reaching 3330 mill m<sup>3</sup> within only 5 years (1950-1955). The consumption of round wood during this period also increased impetuously, reaching 4150 mill m<sup>3</sup> in 1960, 4990 mill m<sup>3</sup> in 1965, and 5570 mill m<sup>3</sup> in 1970. This increase in annual cut was made possible by mechanisation, which required machines, educated workers and the guidance of engineers.

Chain saws, specialised forest tractors and long-span skylines were introduced in Bulgaria in 1948, shortly after WWII. In the beginning, the implementation of chain saws was limited. Chain saws for two operators were employed: Czech RINKO, Russian URAL and, after 1955, German STIHL BL. For a 20-year period after 1957, Russian chain saw DRUZHBA - 4, a console type chain saw for one operator, was used on a large scale. At the same time, Russian caterpillar tractors KT-12 (TDT-40, TDT-55) and – to a lesser degree – Austrian SAURER - MULI were gradually introduced. The productivity in logging increased significantly with the introduction of tractor transportation for long and short assortments and the complex brigade organisation of the work. An additional increase was achieved by implementation of the then most modern means of transport for the time – the skylines. During this period, about 450 Swiss skylines WYSEEN and LASSO Cable were operated in Bulgaria. WYSSSEN skyline turned out to be especially productive for beech timber. The usual technology was to transport assortments in a hanging position towards a truck road in the valley, where most of the forest roads in Bulgaria are located. The patent 44 254/28 02 was awarded to the mechanic Nayden Lilov in 1986 for having replaced the hydraulic system for WYSSSEN and KOLLER wagon operation with a mechanic one that works flawlessly in the low harsh winter temperatures of the Bulgarian mountains.

In 1951, the University of Forestry started a new specialty “forestry engineer-

ing” program where the education of engineers for forest transport and logging was initiated. Under the guidelines of these specialists it became possible to increase the logging during this period. The educated specialists then started the instruction of the first professional forest workers in forest worker schools in Teteven, Berkovitsa, Batak and Velingrad. Large groups of about 50-60 workers were trained for 5 months to become operators of skylines and chain saws.

A similar duration has the modern education program developed for Bulgarian workers in 2009 (FBZ, 2009). As a result of the increased qualification the productivity increased. In 1962, the professional forest worker Hristo Rashkov transported 16 000 m<sup>3</sup> with a WYSSSEN skyline, which for the time was a global record.

This period is the most successful for logging development in Bulgaria because of the progress of mechanisation. The workers were young, born in agricultural regions and highly motivated to reach professional perfection despite their insufficient education (Manolov et al., 2009). Afforestation was also in the focus during this period – with plantations of more than 1 mill/ha.

The period 1970 to 1990. In this period, the demand for timber increased even further. The overexploitation of the decades before and after the war created the unfavourable forest age structure that Bulgaria still has today. In the 60s, the annual timber harvest dropped. In 1967, the Governments of USSR and Bulgaria signed a contract for joint venture logging in the Autonomous Republic of Komi in Northern Russia. According to this contract, Bulgarian forest workers harvested timber in Taiga in very severe climatic conditions about 3000 km away from home. As the payment was adequate, many professional forest workers decided to work there. Annually, 10 000-12 000 people worked in Taiga and harvested a total of 62 mill m<sup>3</sup> until 1992. The education of these workers was done during 3 months in two centres in Bulgaria - Batak and Bansko. The practical training was done partly in Bulgarian forests, partly in Taiga. The following kinds of specialists were trained: chain saw operators; drivers of tracked forest tractors; front loader (crane-operators) and logging truck drivers. Due to the good payment, the number of workers increased as well-educated youth from the cities joined the crews.

The logging technology used in Komi was typical of Russia: clear cutting with DRUZHBA - 4 manual chain saws, hauling with TDT-55 tracked tractors, machine pruning, and transport of the logs using trucks and afterwards train wagons (Arsov, 2008).

The period 1990 until now. In the beginning of this period of political and economic changes, the demand for wood dropped due to the property change of enterprises and the permanent economic crisis of the country. The annual harvest fell quite below the allowable sustainable cut. Towards the year 2000, timber harvest recovered and once again reached the quantities allowed by Forest Management Projects. During the whole period no investments were made in the forestry sector, leading to its decapitalisation. After the year 2000, radical turns were realised in it. The State Forest Enterprises retained the control functions, while their economic

functions were privatised. In consequence, the logging workers transferred to private enterprises.

Between 1993 and 2003, there was no education of professional forest workers in Bulgaria. Novices were instructed by experienced colleagues who transmitted only the most necessary practical knowledge and skills. Certificates for working with a chain saw were awarded by the local forest authorities - State Forestry Enterprises. The workers predominantly belonged to national and religious minorities and were poorly paid. Only recently, due to the increased unemployment in Bulgaria and Europe, young, better educated Bulgarians graduated from secondary technical schools entered into logging. To encourage them to stay in the forestry sector, new and modern technologies are needed - for inside work in a cabin, good professional education and adequate payment.

### **The present day situation**

Mobile educational centers. In 2003, with the support of Bulgarian-Swiss Forest Program (BSFP), specialists started the development of forest worker education programs in Bulgaria for the use of chain saws and brush cutters. Mobile Centres for Forest Workers Education (MCFWE) were established at the University of Forestry and 9 professional schools for agriculture and forestry, equipped with handbooks, machines and vans. The mobile form of education, well known in the world, proved to be extremely practical in the contemporary conditions in Bulgaria (Stiptsov et al., 2005).

The education permit is issued by the Ministry of Agriculture and Food for a period of 3 years. After this period, the MCFWE applies again for a permit. On the base of an Educational program approved by the minister, with a recommended number of hours, each MCFWE develops and implements an educational program. Table 1 shows an example of a program for Certificate Acquisition for working with agriculture and forest technology of the category 'portable technology', i.e. chain saws and brush cutters.

The Ministry established a permanent commission, which examines the applications for education programs by MCFWE, nominates the chairmen for each examination commission and sets a date for the exam. As a general rule, the instructor is the second member of the examination commission. All candidates included in the course have to present a set of documents.

The exam includes a theoretical and a practical part. The theoretical one consists of a test to check the knowledge about working with chain saws and brush cutters. The test consists of 60 tasks on the theoretical content of the training course. The test version for the exam is assigned at random. The time limit is 60 min. The theoretical exam is considered successful if there are no more than 20% errors. Candidates can only take the practical exam if they successfully complete theoretical one.

The practical part consists of preparation of chain saws and brush cutters for

**Table 1.** Educational plan

| N            | Content   | Theory, h | Practice, h |
|--------------|---|-----------|-------------|
| 1.           | Normative base for working with chain saws and brush cutters  | 2         | -           |
| 2.           | Construction and functioning of chain saws and brush cutters  | 20        | 10          |
| 3.           | Technical service and maintenance of chain saws and brush cutters                                     | 10        | 5           |
| 4.           | Occupational safety and personal protective equipment while working with chain saws and brush cutters | 4         | 2           |
| 5.           | Working with chain saws and brush cutters   | 5         | 10          |
| 6.           | On-the-job safety with chain saws and brush cutters   | 2         | 2           |
| 7.           | Fire safety   | 2         | 1           |
| <b>Total</b> |   | <b>45</b> | <b>30</b>   |

work (adjustment, technical service and removal of faults) and their application. The exam cards are prepared in accordance to the type of technique the exam will focus on. Prior to the exam, an instruction is given for the safe use of chain saws and brush cutters. During the exam, the commission intervenes if the examinee does not follow the safety regulations and cancels his exam. The practical exam is considered successfully passed if the candidate proved that he has the knowledge and skills given in the professional-qualification guideline for working with chain saws and brush cutters. The results from the theoretical and practical parts are entered into the exam protocol by the president of the exam commission. Based on the protocol, the Control and Technical Inspection (CTI), issues the Certificate for operating chain saws and brush cutters to those who successfully passed the exam.

Currently, 10 MCFWE established by the BSFP only offer education for chain saw operation. For a 5-day education program the fee is between 60 and 100 € per person, to be paid by the trainee. CTI has representatives in all administrative regions of Bulgaria. Its duties not only include the registration and control of agricultural and forest technologies, but also inspection of the qualification of the workers. The fine in case of lack of qualification (certificate) is 300 €.

**Practice of Forest Research Institute.** Along with the 10 MCFWE of BSFP, the Forest Research Institute - Bulgarian Academy of Sciences (FRI) established its own Mobile Centre in 2004. At the beginning, the experiences of Bulgarian as well as some European centres were investigated, e.g., KWF, Forest School - Gehren (Thüringen, Germany), Forest Academy - Trutnov (Czech Republic), and Austrian centres FAST Ossiach and Ort Gmunden. Courses of working with chain saws, special forest tractors (skidders) and cable cranes were attended in FAST Ossiach. They served as a base for the development of new instruction programs to qualify workers for with the operation of agricultural and forest technologies.

For more than 8 years, we have been conducting education programs for the

operation of chain saws and brush cutters. The trainees are employed in the following economic sectors (Table 2).

It is definitely the greatest interest of forest logging enterprises to work with chain saws and brush cutters and to provide workers with a license in order to meet the administrative requirements. Their workers are typically not novices. They work with chain saws every day and have a range of skills and stereotypes. Nevertheless, they can be interested in mastering new modern methods for logging which could allow them to increase their productivity. Our observations showed that after the course they feel that they have upgraded their technological knowledge and they radically change their attitude regarding safety and the technical maintenance of the chain saw. After obtaining the Certificate for working with chain saws and brush cutters, their self-confidence increases significantly.

**Table 2.** Interested sectors

| Sector  | Relative ratio, % |
|---|-------------------|
| Forestry  | 30.5              |
| Electric distribution companies                   | 55.8              |
| Fire brigades                                     | 4.6               |
| Ministry of civil protection and disaster control | 2.2               |
| Landscape design and communal services            | 1.8               |
| Irrigating companies                              | 1.5               |
| Public roads                                      | 1.2               |
| Construction                                      | 1.1               |
| Railway transport                                 | 0.9               |
| Mines   | 0.4               |
| <b>Total</b>                                      | <b>100</b>        |

The contact of the trainees with the educational centre does not end with obtaining the certificate. They have opportunity to have permanent direct consultations and they often mail photos of interesting cases from their practice. In MCFWE, there is a data base with information about the trainees, the tests, photos from the exam, etc. in order to re-issue lost certificates (annually about 10-15). About a year after the course, an investigation is made in the form of an inquiry with the workers and the enterprises they work for.

Table 3 presents the results from the questioning of 30 professional loggers who passed the course in February - May 2010. Usually, the number in a group is between 6 and 25, and a group consists of trainees from 5 to 7 enterprises. During the investigation period, a total of 124 workers were trained in 7 groups. Along this, the owners of 19 logging enterprises were consulted. Unfortunately, some of the questions pertained to issues considered a company secret by the enterprises.

**Table 3.** Inquiries

| No  | Questions  | Workers, % | Owners, % | Average, % |
|-----|--|------------|-----------|------------|
| 1.  | Did you learn new methods for working with chain saws during the course?               | 93.3       | 26.3      | 59.8       |
| 2.  | Approximately by how many per cent did your productivity increase?                     | 23.3       | 10.5      | 16.9       |
| 3.  | Approximately by how many per cent did the quality of produced assortments increase?   | 40.0       | 15.8      | 27.9       |
| 4.  | Was there any accident during the chain saw operation?                                 | 3.3        | 0         | 1.65       |
| 5.  | Did your income increase after obtaining the certificate?                              | 13.3       | 26.3      | 19.8       |
| 6.  | Do you use a helmet with ear protection and protective work wear?                      | 43.3       | 57.8      | 50.55      |
| 7.  | Is it necessary to periodically run in-service courses?                                | 70.0       | 15.8      | 42.9       |
| 8.  | Is there any necessity for improvement?  | 6.6        | 0         | 3.3        |
| 9.  | Do you have any suggestions for improvement of the education program?                  | 33.3       | 5.3       | 19.3       |
| 10. | Do you agree with the mobile education of forest workers and which are its advantages? | 93.3       | 100       | 96.65      |

The opinion both of the workers and the owners is important for us and, as the interests of both groups are different, we supposed that the truth is somewhere in the middle.

From the analysis of the results we could draw the following **conclusions**:

During the theoretical and practical part of the course new and interesting methods for operating chain saws are presented, which are different from the traditional methods used in Bulgaria. This is confirmed by the high percentage of positive answers - on average 59.8% from contractors and workers. The incorporation of the experience of different European countries contributed to this.

The provocative Qs 2 and 3 aimed at the subjective determination of the course contribution to productivity and product quality. The percentage of positive answers (16.9% and 27.9% on average for both groups) shows the direct advantage of it. The increase in productivity is sure and is considerable. On the other hand, it is far from reaching the productivity of Central Europe, because of such factors as salaries and payment modalities, organisation, working conditions and transport.

Among the workers that answered the Qs, only one had a cutting wound in the lower part of the leg during pruning (Q 4). This worker has a long experience in the profession - 14 years but he was without protective trousers and shoes. Workers in Bulgaria neglect the usage of protective trousers in summer due to high temperatures and the weight of the trousers. This is the main reason for accidents (Morat, 2006).

The salary of forest workers is based on the cubic meters of produced and transported wood. There are no bonuses for quality. According to the general opinion, the income has increased, so we consider the average of 19.8% as realistic. According to our results the increase of the payment is due to the increased productivity (Q 5).

Lately, the use of protective work wear enters into the practice of Bulgarian forest workers and 50.6% for Q 6 is a plausible result. The frequent cases of the 'falling dry branch' during felling convinced the workers to wear a helmet during operation. Unfortunately, the wearing of ear protection is neglected – they are considered bothering.

The wish of forest workers for periodical in-service courses shows the provoked interest towards higher levels of professional qualification (Q 7). The average percentage between workers and employers is 42.9%, which indicates interest and responsibility in the work.

Only a small percentage - 6.6% - recommends improving the course (Q 8). Nevertheless, we systematically introduce new things into the education curriculum.

About 19% recommend increasing the hours for practical work and demonstrations in the forest as well as the visual part of theoretical lectures, e.g. videos and photos (Q 9). The suggestions of the workers are 60 h and 15 h for the practical and theoretical parts, respectively.

The highest percentage in the investigation and the closest results between workers (93.3%) and employers (100%) is in expressing their attitude to the mobile form of education (Q 10). 96.7% approve it emphasizing following economic and social advantages: the mobile education decreases the expenses for education; no trip expenses for the workers are paid - travel, accommodation, meals; the social advantage is that the worker is not separated from family.

On the other hand, the mobile form for us as researchers from the FRI enabled us to be as close as possible to the sector of logging. The contacts and friendship with the numerous contractors and workers are especially valuable. The results from the investigation reached the maximum in reliability due to mutual trust we achieved.

As it was mentioned above, the highest percentage of trainees in MCFWE of FRI (55.8%) are from electric distribution companies. Three quarters of the territory of Bulgaria are operated by 2 companies. In these companies, about 800 workers use chain saws daily. They work under extreme conditions every day as they have to protect themselves from the high-voltage lines and they work with chain saws at a height of 15 m above ground on a instable mobile platform, sometimes with an amplitude of 1 m. For this group of workers, the education is done with wider models and it corresponds very much to the education in Germany (GBG 1 Baumarbeiten im Gartenbau, BGI 887 'Ausästarbeiten in der Nähe elektrischer Freileitungen'). The workers from electric distribution companies receive in-service education from us every other year. It is done in their educational centres in Haskovo Mineral Baths and Pleven.



### **The future of forest workers education**

As mentioned above, up to now there is an interest towards courses on chain saws and brush cutters only. At the beginning the interest was formal - the enterprises or the workers covered the expenses with the aim of receiving a license. Lately, the worsening of the economic situation created a mood in the enterprises to look for internal possibilities to reduce expenses and increase the revenue. Due to this, the interest of the workers does not stop although 'the document market' is nearly exhausted.

The analysis of Bulgarian logging sector in our previous studies showed that there is place for a large number of heavy machines in Bulgaria - skylines and cable cranes, harvesters, and forwarders. There is currently a lack of these machines and, accordingly, there is no demand for qualified staff for them. The re-equipment is delayed by the low prices of the logging - nearly twice lower compared to Germany (Putkisto, 1991). There is some real demand for personnel to operate skylines and cable cranes. Despite their small number nowadays, cable cranes have a high future potential as more than half of Bulgaria's growing stock is located on steep terrain that cannot be harvested by ground-based machines.

As the sector is partitioned between many logging firms, re-equipment will be a slow process. Another factor is the lack of financial incentives. The low demand is an obstacle for the equipment of educational centres. The education of staff for mechanised logging should therefore be done in collaboration with Central European countries. The idea is to obtain a certificate abroad where there is equipment and experience, but to offer preliminary instruction in Bulgaria aiming to reduce expenses and to overcome the language barrier.

At the end we would like to express our opinion on issuing a standardised European Chainsaw Certificate. In 2011, the 10th international meeting of Forestry Education Centres was held in FAST Ossiach. The aim of the Certificate is to standardise the education for chain saw operation in EU to ensure that all the workers have similar skills. For us, it is important that all the instructors follow courses in one centre to obtain a Certificate for permission to teach. Then workers who obtained this EU certificate from different Forestry Training Centres could collaboratively organise the work wherever they are (Novacka et al., 2005).

The improvement of forest worker education in all EU countries is of exceptional importance for the success of the forest sector.

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