risk assessment on benzene exposure following inhalation scenario assessment of U.S.EPA. Those workers (70.67%) had potential lifetime cancer risk higher than acceptable level (>IUR; 2.20E-6).

Conclusion The finding risk matrix is useful in occupational health surveillance program at gasoline station and for risk control identification. Annual health check-up, monitoring of biomarkers and benzene concentration, and risk communication are necessary to prevent workers adverse health effects and cancer.

1421 QUANTITATIVE INHALATION EXPOSURE ASSESSMENT ON AIRBORNE PARAQUAT EXPOSURE OF HERBICIDE KNAPSACK SPRAYERS

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Introduction Paraquat is hazardous chemical, widely used as herbicide, and was imported for 31 552 tons to Thailand in 2016. However, there was almost no report of inhalation risk assessment in Thailand. This cross-sectional analytic study was designed to quantify the inhalation exposure to airborne paraquat during spray operation of knapsack sprayers.

Methods The study was conducted in 30 voluntary herbicide knapsack sprayers in a District of Khon Kaen province, Thailand. The airborne paraquat concentration, working and personal characteristics of sprayers were used for inhalation intake calculation following U.S. EPA (1991) equation. The selected concentration of airborne paraquat was from monitoring with active personal sampling using PTFE filter membrane and analysed with HPLC.

Results The paraquat knapsack sprayers were farmers in sugarcane, cassava, rice, and corn field. Paraquat dichloride was used at 0.1–2400 litres/year. Adverse symptoms related to respiratory system were throat/upper airway irritation, runny nose (not from flu), wheezing, and difficulty breathing. The inhalation intake of paraquat exposure in short term effect, long term effect, and specific effect of lung (chronic pneumonitis) were calculated by using paraquat concentration at 125.49 $\mu g/m^3$. The intake estimations were between 0.00011 to 0.04610 mg/kg/day. The health risk was presented by hazard quotient (HQ>1). $HQ_{long\ term}$ was 0.263–115.25 when compared to recommended $AOEL_{long\ term}$ (0.0004 mg/kg/day). $HQ_{short\ term}$ was 0.211–92.202 when compared to recommended $AOEL_{short\ term}$ (0.0005 mg/kg/day). $HQ_{chronic\ pneumonitis}$ was 0.023–10.245 when compared to the reference dose (0.0045 mg/kg/day).

Conclusion It can be summarised that at the selected concentration and without using respirator of sprayers, this study found that 66.67%, 63.33% and 13.33% of Thai knapsack sprayers were under unacceptable risk of long term exposure, short term and chronic pneumonitis, respectively. This information should be communicated to the public health related institutes and farmers for seriously preventive regulation on inhalation exposure to paraquat.

1453 URINARY COTININE IN TOBACCO FARMERS IN SOUTHERN BRAZIL

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Introduction High levels of cotinine have been related to the occurrence of green tobacco sickness (GTS), however chronic exposure to nicotine develops tolerance. The objective of this paper is to describe urinary cotinine levels in tobacco farmers.

Methods A cross-sectional study was conducted in 2570 tobacco farmers. All participants that report GTS in the week prior to the interview plus a subsample of 492 pesticide applicators were included. Urinary samples and information about socio-demographic, behavioural, dietary, occupational characteristics and pesticide poisoning during lifetime were collected. Stratification by sex and smoking was performed and Wilcoxon and Kruskal-Wallis non-parametrical tests were used to analyse cotinine means.

Results 582 individuals were analysed. There was no difference in urinary cotinine means between GTS symptomatic and asymptomatic individuals. Among non-smokers, having picked tobacco in the previous week was associated with higher cotinine means in both sexes. Cotinine levels were higher on the first day of symptoms and reduced exponentially with each day in female non-smokers. Male non-smokers had higher levels on the second day and the reduction was more gradual. The cotinine level rose up to 15 cigarettes/day of consumption.

Conclusion The urinary cotinine measures exposure to nicotine up to its saturation point; while GTS, affected by tolerance, indicates nicotine poisoning. Strategies to reduce nicotine exposure in tobacco production are needed. Mechanisation to be used in rough ground and which guarantee leaf quality could be an alternative. More studies are needed to evaluate the chronic effect of nicotine exposure.

1463 PM10 EXPOSURE AND GENE EXPRESSION MODULATION IN A POPULATION OF HEALTHY STEEL WORKERS

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Introduction The association of gene expressions with exposure to ambient particulate matter (PM) concentrations is still mainly explorative. We took advantage of a study designed to evaluate the short-term association between PM exposure in working environment and biological molecular targets to assess the correlation between PM10 exposure and gene expressions of 44 genes.