161 - SMENT OF FACTOR OF EXPOSURE TO THE HEAT IN WORKERS OF CUTTING MANUAL OF SUGAR CANE

ERIVELTON FONTANA DE LAAT[1];
RODOLFO DE ANDRADE GOUVEIA VILELA[2].
1. Capes/PPGEP-Unimep/Unicentro-Pr; Piracicaba-SP; Brazil
2. FAPESP/PPGEP - Unimep and CEREST/Piracicaba-SP; Brazil
eriveltonlaat@bol.com.br; ravilela@unimep.br

INTRODUCTION

The health of the worker has in recent years, aroused concerns of regulatory bodies relations in the health-disease work, and are offering advice on the wearing of certain types of industrial activity, as a way to establish the load limits of the worker. A physical verification of the load of work was the first problem addressed by the physiology of labor and remains a central issue for most workers of the world, especially for those working in sectors most sensitive to high temperatures and accelerated pace of production.

The activities, including the work, have at least three things to consider: physical, cognitive and psychological. Each one of them can determine a burden and are inter-related, as noted Wisner(1997).

The analysis of the physical environment of work aims to meet the conditions for the activities (FIEDLER, 1998). According Lopes et al. (2004), the scientific data of the conditions of exposure of workers to weather conditions, lighting, noise and vibration must be compared with the minimum and maximum values set by the standards of safety in the workplace. With this, it is possible to propose improvements in the way in which transactions are conducted with greater comfort, well-being, health and safety, leading, therefore, to improve levels of quality, efficiency and productivity.

The industry alcooleiro is presenting booming in recent years due to environmental impacts associated with the possible scarcity of fossil fuels and the search for alternative fuels in the world. In eight years, Brazil will expand the plantations of sugar cane in more 3.1 million hectares west and the center will be the new frontier of the cane. With the current construction of 89 more wrestling, which will operate 19 already in the year of 2006, is expected to create 200,000 more vacancies to meet the expansion of planting (ISTO È DINHEIRO, 2006).

However, this sector presents problems related to several factors that affect the safety and health of workers, are: environmental, physiological and related to the organization. Besides the aspects related to health and working conditions, the process of production of cane has been the subject of studies in the social aspects arising from migration, precarious housing, and others involving this process to important environmental impacts as soil degradation, air pollution the burning of straw (CANÇADO, 2003).

These factors in cutting cane sugar has been the subject of discussions in society, in view of the possible impacts of this activity on wear of workers, coupled with the growing expansion of the sector. The matter is still little studied in the scientific national and international, with lack of literature. At the importance of the culture of sugar cane for the center-south region of Brazil, considering the large number of workers involved and the scarcity of research in this area, the applications of measurements of the physical load of work are important contributions to the knowledge most of the detailed work of the harvest of sugar cane.

In the period 2004-2005 the Ministry of Public Work of the 15th Region (Campinas and Interior) has been suspected of the relationship of the events of 13 deaths to working conditions which would have led workers to exhaustion (BOLETIM INFORMATIVO DA PROCURADORIA REGIONAL DO TRABALHO DA 15ª REGIãO, 2005). As study of applicators with insecticide to combat dengue with the use of motorized equipment costal (VILELA et al, 2005) exposure to excessive heat can cause serious risks to the health of workers. In this condition, the sweating is one of the fundamental mechanisms for regulation of the internal temperature of the body, which Occursthrough evaporation.

A combination of factors related to exposure to heat, loss of water and electrolytes and storage of heat can lead to the intermação (sunshine) of the human body and can develop into the death, as reported by Fox (1991, p. 350) when referring to twelve (12) deaths occurred in a range of three (3) years between athletes who practiced football.

Already by the observation of performance, the dehydration from prolonged physical activities is a major limiting factor of human performance (GUIMARÃES & SILAMI - GARCIA, 1993; SAWKA, 1992). Different studies have reported the importance of the state of hydration on tolerance to prolonged exercise, suggesting that when individuals are hydrated they respond better to raise the body temperature, than when they are dehydrated (BARR, COSTILL & FINK, 1991).

The purpose of this study was to assess the burden of exposure to the heat in the manual workers of cutting sugar cane, in the interior of São Paulo state, listing the measurements with the national standards and international human.

METHODOLOGY

This work was developed with data collected in areas planted with sugar cane in the state of Sao Paulo. The day of work in the company had run for 8 h and 30 min, within five working days of pears a day of vacation, starting with the 7 and ending at 15 h and 30 min. The interval for lunch not existed in practice.

In the field, measurements were made of the Index of Wet Bulb Globe Thermometer in, using equipment instrument Thermometer, Model pervasive Globo Digital brand Instrutherm positioned in areas exposed to the sun set on height of 1.20 meters corresponding to the position that the workers maintain the trunk during most of the day.

The Index of Wet Bulb Globe of-Thermometer (IBUTG), is defined by the equations written below, considering the internal or external environments without load solar, and external environments with solar load (SAFETY AND MEDICINE TO WORK, 1998):

$$IBUTG = 0,7\ tbn + 0,1\ tbs + 0,2\ tg$$

where:
Tbn-wet bulb temperature of natural, ° C
Tg-temperature of globe, ° C
Tbs-bulb temperature of dry, ° C

The tolerable limits for exposure to heat were established according to the Brazilian Law of Activities and Operations

Insalubre (SAFETY AND MEDICINE TO WORK, 1998) as Table 1.

Regime working with intermittent rest on the job (p / hour)	Type of activity		
	Work Take Ibutg ° C (< 150 kcal-h)	Work Moderate Ibutg ° C (150-300 kcal-h)	Work Heavy Ibutg ° C (> 300 kcal-h)
Still Working	To 30,0	To 26,7	To 25,0
45 min of work 15 min rest	30,1 to 30,6	26,8 to 28,0	25,1 to 25,9
30 min of work 30 min rest	30,7 to 31,4	28,1 to 29,4	26,0 to 27,9
15 min of work 45 min rest	31,5 to 32,2	29,5 to 31,1	28,0 to 30,0
It is not allowed to work without the adoption of appropriate measures of control	Above 32,2	Above 31,1	Above 30,0

It is not allowed to work without the adoption of appropriate measures of control

RESULTS AND DISCUSSION

The survey was conducted over two days in the month of may 2007, on a rural property leased in the interior of São Paulo state, the data were collected in the month of may 2007, at the start of the cane crop in the region. The temperature and relative humidity maximum, medium and minimum during this day were:

Temperature: Maximum of 29.5 °; Average of 25.6 ° and minimum of 16.3 °;

Humidity on the Air: maximum of 53.8%; Average 47.0% and minimum 39.7%.

Table 2. Results of the thermal load-Index Bulb Humid Thermometer to Globe 1 day:

	07h45	08h15	08h40	09h05	09h30	10h00	10h30	11h00	11h30	12h00	12h30	13h00
GLOBE	18,4	25,0	30,5	31,4	32,8	34,9	36,4	37,5	35,4	43,9	41,1	33,3
BULB DRY	17,4	23,4	24,0	22,5	24,0	24,3	26,7	25,2	25,7	31,3	27,0	26,2
BULB HUMID	16,4	19,3	19,0	18,9	19,3	19,7	21,1	19,8	19,9	22,0	19,6	19,2
IBUTG	16,8	21,0	21,8	21,8	22,5	23,3	24,8	24,0	23,5	27,4	24,5	23,0

Table 3: Results of the thermal load-Index Bulb Humid Thermometer of Globe, 2 day:

	07h30	08h00	08h30	09h00	09h30	10h00	10h30	11h00	11h30	12h00	13h30
GLOBE	20,0	28,1	29,3	33,1	33,8	36,2	38,3	39,7	39,0	39,0	41,8
BULB DRY	17,1	20,1	21,2	23,8	25,9	27,2	29,1	30,6	30,5	30,7	31,3
BULB HUMID	16,6	18,5	19,4	20,3	21,4	21,1	22,3	23,1	22,5	21,5	22,4
IBUTG	17,1	20,4	21,4	23,1	24,4	24,7	26,2	27,3	26,6	26,0	27,3

	14h00	14h30	15h00	15h30
GLOBE	41,2	40,9	39,2	33,7
BULB DRY	33,4	32,7	30,5	29,7
BULB HUMID	23,2	22,7	21,5	20,6
IBUTG	27,9	27,4	26,0	24,1

The thermal overload on the first day, as measured by the Index of Bulb Humid Thermometer of Globe - IBUTG, struck at 12:00 hours the mark of 27.4 °. The minimum value was reached at 7hs the morning with 16.8 ° and the average during the day of IBUTG was 26 °. On the second day the minimum was reached at 7:30 pm with 17.1 ° C and the maximum was reached at 14:00 pm with index of 27.9 ° C.

It is worth noting that the standard regulamentory paragraph 15 of the Ministry of Labor and Employment to define an activity is characterized as heavy as the cut of the cane, the limit of IBUTG of 25.0 ° C, from which action must be taken as hydration, breaks for rest in shade, among others.

For values of IBUTG between 26.0 ° to 27.9 °, the standard provides for a system of 30 minutes of work by 30 minutes of rest. Already the American standard of Ilo (2005) defines, for activities that require garments closed and heavy equipment for protection, as in the case of workers of cutting cane (gloves, mangotes, perneiras, touches Arabic, cap, trousers etc.), the decrease the 2 ° C in the ceiling of IBUTG through factor called 'clo'.

Commenting on the tables is the first day the limit was exceeded 10.00-12.30 and the second day was exceeded 9.00 - 15.30. It should be noted that the crop of sugar cane is from May to November, and this time it was analyzed is considered the most mild of the season.

FINAL CONSIDERATIONS

The many requirements of condition of employment in sectors beaten by high temperatures and accelerated movements are still present in our society, thereby seeking an alternative to the minimization and understanding of these problems. Perhaps this requirement is required by the attention, pressure and the concentration that only the sync the movement and speed pre-selected in evaluation.

Within a multidisciplinary approach, as Wisner (1997) the contribution of physiological analysis to the problems of attrition of workers can set itself, a procedure help the health of the worker. Under the conditions of development of this work, based on the analysis and discussion of results, this research has come to the following conclusions: the climatic conditions in the workplace were outside the range permitted by the legislation, except the period of the early day of work . The average of two days of measure of IBUTG in this period of day of work, should be 30 minutes of work and 30 minutes of rest.

As analyzed, it is essential to continue the evaluation of thermal overload by Index Bulb humod Thermometer of Globe in order to track exposure to the sun as important factor of dehydration and the wear of workers. It is with biochemical indicators, heart rate and review ergo of work, continuing the monitoring of sunshine than the relative humidity during other times in the crop.

It noted that this study is part of another, more elaborate stamp, whose goal is to analyze the wear in the system of work for cutters manuals of sugar cane, thus setting a new environment on the matter.

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Rua Pacífico Borges, n.° 40 - down town - postal code. 84500-000, Irati, Parana, Brazil.
eriveltonlaat@bol.com.br

ASSESSMENT OF FACTOR OF EXPOSURE TO THE HEAT IN WORKERS OF CUTTING MANUAL OF SUGAR CANE

ABSTRACT

The health of the worker has in recent years, aroused concerns of regulatory bodies relations in the health-disease work, and are offering advice on the wearing of certain types of industrial activity, as a way to establish the load limits of the worker. The purpose of this study was to assess the burden of exposure to the heat in the manual workers of cutting sugar cane, listing the measurements with the national standards and international human. It was developed with data collected in areas planted with sugar cane in the state of Sao Paulo. The day of work in the company had run for 8 h and 30 min, where the measurements were made of the Index of Wet Bulb Globe Thermometer in, using equipment instrument Thermometer, Model pervasive Digital Globe Instrutherm mark. The survey was conducted over two days in the month of may 2007, on a rural property leased in the interior of São Paulo state, the data were collected in the month of May 2007, at the start of the cane crop in the region. This search has come to the following conclusions: the climatic conditions in the workplace were outside the range permitted by the legislation, except the period of the early day of work. The average of two days of measure of IBUTG in this period of day of work, it should be 30 minutes of work and 30 minutes of rest.

KEY-WORDS: thermal load; sugar cane; temperature.

FACTEUR D'éVALUATION DE L'EXPOSITION à LA CHALEUR CHEZ LES TRAVAILLEURS DE LA COUPE DE LA CANNE à SUCRE MANUEL

RÉSUMÉ

L'état de santé du travailleur a, ces dernières années, a suscité des préoccupations des organismes de réglementation des relations dans la santé, la maladie travail, et proposent des conseils sur le port de certains types d'activité industrielle, de façon à établir les limites de charge du travailleur. Le but de cette étude était d'évaluer la charge de l'exposition à la chaleur dans les travailleurs manuels de couper la canne à sucre, énumérant les mesures avec les normes nationales et internationales humaine. Il a été élaboré à partir de données collectées dans les zones plantées de canne à sucre dans l'Etat de Sao Paulo. La journée de travail dans l'entreprise avait une durée de 8 h et 30 mn, lorsque les mesures ont été effectuées de l'Index de Wet Bulb Globe thermomètre à l'aide d'équipements d'instrument Thermomètre, modèle omniprésent Digital Globe Instrutherm marque. L'enquête a été menée pendant deux jours dans le mois de mai 2007, sur une propriété rurale louées à l'intérieur de l'État de São Paulo, les données ont été recueillies au cours du mois de mai 2007, au début de la récolte de canne dans la région. Cette recherche est venu de tirer les conclusions suivantes: les conditions climatiques ont été dans le milieu de travail en dehors de la plage autorisée par la législation, à l'exception de la période du début de la journée de travail. La moyenne des deux jours de mesure de IBUTG en cette période de la journée de travail, il faut 30 minutes de travail et 30 minutes de repos.

MOTS-CLÉS: charge thermique; La canne à sucre; Température.

EVALUACIóN DE LOS FACTORES DE EXPOSICIóN AL CALOR EN LOS TRABAJADORES DE CORTE MANUAL DE CAñA DE AZúCAR

RESUMEN

La salud de la trabajador en los últimos años ha, despertó preocupaciones de los órganos reguladores en las relaciones de la salud, y se ofrece asesoramiento sobre el uso de ciertos tipos de actividad industrial, como una forma de establecer los límites de carga del trabajador. El propósito de este estudio fue evaluar la carga de la exposición al calor en el corte manual de los trabajadores de la caña de azúcar, con una lista de las mediciones con las normas nacionales e internacionales. Fue elaborado con datos recogidos en las zonas plantadas con caña de azúcar en el estado de Sao Paulo. El día de trabajo de la empresa tenían una duración de 8 horas y 30 minutos, donde se han realizado las mediciones del Índice de Wet Bulb Globe en el termómetro, usando equipo instrumento termómetro, omnipresente Modelo Digital Globe Instrutherm marca. La encuesta se

realizó durante dos días en el mes de mayo del 2007, en una propiedad rural arrendadas en el interior del Estado de São Paulo, los datos fueron recolectados en el mes de mayo de 2007, al comienzo de la cosecha de caña en la región. Esta búsqueda ha llegado a las siguientes conclusiones: las condiciones climáticas en el lugar de trabajo se encontraban fuera del rango permitido por la legislación, excepto el período de los primeros días de trabajo. El promedio de dos días de medida de IBUTG en este período de los días de trabajo, debería ser 30 minutos de trabajo y 30 minutos de descanso.

PALABRAS CLAVE: carga térmica; caña de azúcar; temperatura.

AVALIAçãO DA CARGA DE EXPOSIçãO AO CALOR EM TRABALHADORES DO CORTE MANUAL DA CANA-DE-AçúCAR

RESUMO

A saúde do trabalhador tem nos últimos anos, despertado preocupações das entidades normativas das relações saúde-doença no trabalho, e vêm propondo pareceres sobre o desgaste de determinados tipos de atividades laborais, como forma de estabelecer limites à carga do trabalhador. O objetivo deste trabalho foi de avaliar a carga de exposição ao calor em trabalhadores do corte manual da cana-de-açúcar, relacionando as medições com a as normas nacionais e internacionais vigentes. Foi desenvolvido com dados coletados em áreas plantadas com cana-de-açúcar no interior do estado de São Paulo. A jornada de trabalho na empresa teve duração de 8 h e 30 min, aonde foram efetuadas as medições do Índice de Bulbo Úmido Termômetro de Globo, utilizando equipamento instrumento Termômetro de Globo Modelo TGD Digital marca Instrutherm. A pesquisa foi realizada em dois dias no mês de maio de 2007, em uma propriedade rural arrendada no interior do estado de São Paulo, os dados foram coletados no mês de maio de 2007, por ocasião do inicio da safra da cana na região. A presente pesquisa permitiu chegar às seguintes conclusões: as condições climáticas no ambiente de trabalho estavam fora dos valores admissíveis pela legislação, com exceção do período mais cedo da jornada de trabalho. Na média dos dois dias de medida de IBUTG, neste período de jornada de trabalho, deverá ser de 30 minutos de trabalho e 30 minutos de repouso.

PALAVRAS-CHAVE: carga térmica; cana-de-açúcar; temperatura.