Reduce Noise in the Cab of the Tractor MF399 Sugar Transport Operation

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ABSTRACT

Driving safety is one of the managers of intellectual pursuits. Despite all the precautions that are taken. Many things can happen in agriculture, 48% percent of these accidents are caused by agricultural motor vehicles, of which 28% is related to tractors. Along with the advancement of technology and the use of machinery in agriculture to increase crop production, control creates problems such as noise, vibration; pollution, etc. have all this attention in the design of cars as a necessity indicates. Massey Ferguson tractor MF399 tractors in Khuzestan cane agro-industry companies to transport sugar cane from farm to factory to be used. In this study, MF399 tractor cabs and cab closed back cabin with two state sound pressure levels were studied and tested and Results out of the tractor cab have a significant impact on reducing the noise level is such that there is an open cabin with an in dB (A) 3 of the sound level is reduced. Depending on the cab mode changes the engine speed increases the sound pressure level, the difference between the average sound level of engine speed rpm 1500, rpm 1750 rpm 2000 and the 01/0 is significant. The gear change, the difference between the sound pressure level Massey Ferguson tractor cab was more open so that the transmission medium is between 1 dB (A) 2. Most sound level for tractor cab with open cockpit, the transmission medium and the amount of 1 dB (A) 2/89 reached nearly dB (A) 1/3 reduction is sound. Pull tractor cab with open windows, when the windows are closed, significant variations in sound level with opening cabin increase are observed. Changes in time, the MF399 tractor cabin noise levels with windows open as Massey Ferguson tractors without cabs was significant at the 1% level and that the level of load on the tractor cabin, in the form of sugar transport operations, a significant difference seen. Overall, the car even if the windows are open, largely avoids the noise at the driver's ear.

INTRODUCTION

Noise pollution is a problem that is affecting all mechanical technology. Agricultural machines due to tension and torque than the larger components of these components during operation can make sounds louder and more grating. Along with the advancement of technology and the use of machinery in agriculture to increase productivity, control creates problems such as noise, vibration, pollution, all the attention in the design of cars as a necessity to show. Log in mechanization and agricultural machinery farm, but despite all the benefits, Problems in relation to occupational health and safety arising from work with this system is followed that include noise as a result of working with this machine. Tractor noise on the driver's side effects including cases such as: Temporary or permanent hearing loss, the effect on the visual effects system and creating a state of balance, dizziness, nausea and abnormal gait, causing neurological disorders, psychological irritation, decreased work efficiency and less attention to them it is in Iran. In advanced countries, the tractor design is done in such a way that in addition to technical proficiency, according to the driver's health. But in developing countries, according to the health and safety of drivers in cars less attention.

Sound levels in all gears for tractors without cabs from 91 to 93 dB. Cab Tractor with cab and window open: 86 to 88 dB, charge off the tractor and disc plow than no time by a significant effect on the level of noise in 1st gear is light.

Hours of work permits for tractors without cab driver in less than 2 hours to reach the auditory system damage. Tractor manufacturers recommend the cabins to be installed [1].

The tractor cab and load bearing gear changes, no significant influence on the sound level values, while for tractors without cabs, the sound pressure level changes, is more sensible. In general, the tractor cab prevents accumulation of sound pressure level due to gear changes and the load on the tractor and the dB (A) 10 reduced
the average sound pressure level will follow, Long et al., and Long and colleagues. Speeding up front due to the change in gears and engine rpm, speed km / h 9/2 is the noise level increases more rapidly than its sixth decline and reduced sound pressure level. Laar prosperity and Associates Expressed in research on the tractor without a cab driver's ear in all cases, noise levels higher than is the standard level dB (A) 85. Tractor cab with an open cockpit, no cabin noise level is less than kind, but yet still concerned over the standard of review and the studies seem to Berthi et al That the sound pressure at the driver's ear position tractors without cabs or cab with open windows was standard in most of the cases above the noise level dB (A) 95, respectively. In a prospective study between reported that most modern tractors above the noise level dB (A) 85 to produce, while other agricultural machines such as combines and are dryers, high sound dB (A) 100.

MATERIALS AND METHODS

To evaluate the noise of tractors and their relationship with job variables, the measurements must be done under certain conditions and standards. Therefore, the test requires a certain level of tractors for each variable, the type tractors, motor rotational speed, gear ratio, and the state of the basket carries sugar (full or empty) is selected. Tractor test site that features instructions on 5-CODE, OECD is as follows: Measure the area of flat, open space, free from dust or snow cover, respectively. Large reflecting surfaces such as buildings, machines and other advertising boards and the distant trees with a diameter at least m 15 of the tractor or the microphone should have been tested. When measuring wind speed km / h 14 and between 33 to 35 °C ambient temperature and humidity, as well as 53 Percent. It should be noted that the OECD standard measurements during rain, snow or rain or thunderstorms are not allowed. The position of the driver's right ear microphone distance mm 100 driver and where the horizontal microphones are analyzed. Ambient sound level at least dB (A) 10 is less than the noise level has been measured. For noise measurements, the capacitive microphone is equipped with a Lutron SL4013 scale was used. At least 5 minutes prior to measurement noise tractor lit by warm engine to normal operating temperature is reached. This was due to the unusual sound of the engine during operation to prevent global warming. This can be due to the ignition delay period is more than the normal operating mode of said engine, Because fuel is sprayed in the air in the combustion chamber, which is relatively cooler. After a period of at least 500 meters distance from the tractor and moved to a different gear gearboxes and other parts of the tractor to reach normal operating mode [6]. To achieve the repeatable observation of the high points of data capture is very essential and placing a microphone next to the right ear of the driver, on each treatment combination, a distance of 30 meter and a distance of 10 meters, a sound level will recorded. Statistical design of tractor noise measured at four different levels following treatment each of the three replications in a factorial experiment in a completely randomized design and Duncan mean comparison test is performed:

1 - tractor carrying a straw basket in the cabin depending on cabin and open cabin
2 - Basket packed with two levels
3 - The three levels of engine speed rpm 1500, rpm 1750 rpm 2000 and
4 - Heavy Gear Levels 1, 2 heavy and 1 medium

SAS software was used for data analysis and Excel to plot graphs. In this study, the noise level Massey Ferguson MF399 tractor cabs and cab 399 in healthy condition without their characteristics in Table 1 were measured, and were recorded.

Table 1: Specifications of the test tractor.
<table>
<thead>
<tr>
<th>MF399 cab guard</th>
<th>Engine Type</th>
<th>Number of cylinders</th>
<th>The characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel four-stroke direct injection</td>
<td>6</td>
<td>rpm 2200</td>
<td></td>
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Discussion and conclusions:

To show the influence of cabin tractor in controlling noise at driver's ear according to the instructions in the test car - Agriculture, Governor international OECD-CODE 5, tractor cab with MF399 in a cabin with a window open, test the sound level was placed the average results for the major factors in the diagrams (1) to (4) is given.

In Figure (1) and (4) is considered, the main effect of the type of tractor cab significant effect on reducing the noise level is such that there is considerable open cabin with an in dB (A) 3 of the sound level is reduced.

Fig. 1: The effect of sound pressure level MF399 tractor tractors without cabs and cab, dB (A).
Depending on tractor cabs and cab mode changes the engine speed increases the sound pressure level, the difference between the average sound level of engine speed rpm 1500, rpm 1750 rpm 2000 and the 01/0 is significant. Most sound level MF399 tractor cab back to the engine speed rpm 2000 dB (A) 3/88 reached according to the diagram (2) Almost dB (A) 4/1 reduction is sound. But at lower engine speeds, the difference was more so that the noise level in the cabin open MF399 tractor engine speed rpm 1500 and 1750, respectively, 4/4 and 4/72dB lower than the MF-free the cabin is. And have determined that the cabin noise level is reduced.

![Fig. 2: Effect of different engine speeds MF399 tractor cab with sound pressure levels in both open and closed cab, dB (A).](image1)

Ger changing and increasing, so that by comparing the graphs (3) can be seen, the difference between the sound pressure level Massey Ferguson Massey Ferguson tractors without cabs and cab were open more so that the rib 1 is medium differences dB (A) 2. Most sound level for tractor cab with an open cockpit, the transmission medium and the amount of 1 dB (A) 89/2, which reached the charts (3) Almost dB (A) 3/1 noise reduction has ¬ Pull tractor cab with open windows, when the windows are closed, significant variations in sound level with opening cabin increase is observed.

![Fig. 3: The effect of ribs on the sound pressure level MF399 tractor cab with both open and closed cab, dB (A).](image2)

Changes in time, the MF399 tractor cabin noise levels with windows open as Massey Ferguson tractors without cabs was significant at the 1% level and that the level of load on the tractor cabin, in the form of sugar transport operations, significant differences you can see the diagram (4). Most difference in sound pressure level between Massey Ferguson tractors without cabins and cabins with window pain, Differences in general, even if the cabin windows are open, largely avoids the noise at the driver's ear.
Fig. 4: The effect of different loads on the sound pressure level MF399 tractor cab with both open and closed cab, dB (A).

Overall, the car even if the windows are open, largely avoids the noise at the driver's ear.

REFERENCES