MICHIGAN State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824 • 1-517-353-1846 • https://oem.msu.edu

REPORT#: **17MI136** **REPORT DATE:** 9/13/19

Farm Laborer Pinned by Tree Branch Against His Tractor Seat

INCIDENT HIGHLIGHTS

DATE:
Summer 2017

TIME:
Between 12:30p.m.-1:45p.m.

VICTIM:
Farm laborer in his 80s

INDUSTRY/NAICS CODE:
Agriculture/11

EMPLOYER:
Cattle, Crop Farmer

SAFETY & TRAINING:
Tractor training

SCENE:
Field near tree line

LOCATION:
Michigan

EVENT TYPE:
Struck by

SUMMARY

In summer 2017, a male farm laborer in his 80s died when he was pinned by a tree trunk while sitting in his tractor seat. The decedent was using a Kubota MX5000 52-hp tractor equipped with a Kubota LA852 loader bucket and a brush hog to mow weeds to maintain an unused parcel of land. A tree in the tree line on the side of a field had fallen into the field. The tree had several branches that formed a "Y". The incident occurred while the decedent, seated in the tractor seat, attempted to use the loader bucket as a bulldozer to move/push the tree to the side. After several attempts to move the tree, it appeared one of the tree branches rolled/came over the bucket. ..... READ THE FULL REPORT> (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- The weight, length, configuration and possible attachment point of tree being moved
- Use of a loader bucket rather than a brush rake or grapple to move tree
- Tree line brush/undergrowth hindered tree movement

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RECOMMENDATIONS

MIFACE investigators concluded that, to help prevent similar occurrences, employers should:

- Ensure employees use appropriate tractor attachments to perform needed work.
- Develop and implement a farm safety plan.

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Michigan Fatality Assessment and Control Evaluation (FACE) Program

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SUMMARY

In summer 2017, an 80-year-old male farm hand died when a tree branch from the downed tree being moved by his tractor's loader bucket struck him (Photo 1). The decedent drove the Kubota MX5000 tractor equipped with a brush hog and a Kubota LA852 loader in the front to a 10-acre field to mow it; the now unused crop field was being maintained for future sale. He arrived at the site mid-morning, mowed for a while, ate lunch with a property owner adjacent to the property being mowed, and then resumed the task. The incident occurred near a tree line while he was mowing the perimeter of the property. A tree had broken near the base of the trunk and had fallen from the tree line into the field in the mowing path. The tree had several branches that formed a "Y". The incident occurred while the decedent, seated in the tractor seat, attempted to use the loader as a bulldozer to move/push the tree to the side and out of the field. Per the police report, it appeared the decedent had made several attempts to move the tree; there were marks on the hydraulic arms of the loader as well as paint transfer to the tree consistent with the hydraulic arm dimensions. On the decedent's last attempt, it appeared the tree "rolled" up and over the bucket and a branch struck and pinned him in the tractor seat.

Photo 1. Downed tree being moved by decedent using a loader bucket. View from within tree line.

INTRODUCTION

In summer 2017, a male farm laborer in his 80s died when he was pinned by a tree branch while sitting in his Kubota 5000 tractor. MIFACE learned of this incident upon receiving notification from MIOSHA. MIFACE personnel contacted the farm owner who agreed to be interviewed by telephone. MIFACE reviewed the death certificate, police and medical examiner reports, and the MIOSHA file during the writing of this report. Pictures used in the report are courtesy of the responding police department.

EMPLOYERS

At the time of the incident, the employer was in the process of scaling down his business in preparation for retirement. The employer had, at one time, 80 acres and raised 30 head of cattle; he grew crops on some of the acreage and leased out some of the acreage to other farmers. He was gradually reducing the farm size, cutting back on farming, renting and selling property and selling off equipment. The decedent was mowing properties to keep them in good condition for potential buyers. The employer and decedent were close friends.

WRITTEN SAFETY PROGRAMS AND TRAINING

The farm did not have a written safety program, nor written educational material. The employer stated to the MIFACE researcher that he did not have a "formal" training program but had given verbal instruction on safe tractor operation including PTO training and using blocks for raised equipment (including loader). He indicated the farm used HEPA filters on the vacuum if working in a dusty operation. He also stated that he had never had interaction with MIOSHA (either compliance or consultation) prior to the incident. He had accessed MSU Extension materials as needed. He also mentioned that the decedent had plenty of experience in farming, and if the decedent had any questions about safety, the decedent would have been comfortable asking the question and the employer would be comfortable answering it.

The employer mentioned that he had not had any reportable incidents in the past 50 years. He had only two "accidents"; a back strain and a young boy who had a spike go through his shoes.

WORKER INFORMATION

For over 40 years, the decedent had his own farm. In addition to farming, the decedent had worked full-time for another business. The decedent had quit farming approximately 10 years ago. The decedent had, for the past 50 years, worked part-time for the employer.

For the past five years, the decedent worked approximately 20 hours a week and received a paycheck every two weeks. The decedent typically started working at 7:30 a.m. and worked until 3:30 p.m. to 4:00 p.m. On the day of the incident, he arrived at approximately 8:00 a.m. The decedent decided which days to work and what hours to work each week.

Per the employer, the decedent had over 1,000 hours of driving the Kubota tractor/mower/loader and was very familiar with its operation.

Photo 2. Topography of field. Power lines, slope and tree line. Location of decedent's tractor near tree line.

The employer stated that the decedent used the tractor/loader to move brush 3-4 times per year and had used grapples to move/harvest a downed tree so that the employer could cut up the tree and utilize for heat and/or sell.

INCIDENT SCENE

The incident scene was a 10-acre unused former crop field located approximately 4.5 miles from the farm. The field was positioned under power lines, had residential homes on one side and a tree line on the other side. The field sloped slightly downward from the residential side to the tree line (Photo 2).

The field was accessed by gated entrance from a public roadway (Photo 3). The decedent drove the Kubota MX5000 tractor with a foldable rollover protection structure (ROPS) in the protective position. The tractor was equipped with a slow moving vehicle sign, vehicle marking/lights and seatbelt in place. The tractor had a brush hog (mower deck) at the rear and a Kubota LA852 loader in the front.

Photo 3. Gated entrance to field from road. Also shows area that had been mowed.

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The MSU Forestry Department was consulted to assist in identification of the tree involved in the incident. Based on police photographs, MSU Forestry indicated there was some uncertainty in the tree species identification because the tree was dead and no leaves were present, but based on both the appearance of the outer bark (smooth with long grooves) as well as the fibrous inner bark that was exposed at the point of contact with the tractor, the tree was likely a red oak (*Quercus rubra*) or closely related black oak (*Quercus velutina*), or a natural hybrid of the two. The tree had broken approximately three- to four- feet above the ground. The employer told the MIFACE researcher that the tree height would have been approximately 25-30 in length long and was entangled in wild grape vines. The trunk was approximately two feet in diameter and the tree limbs that formed the "Y" were approximately 14 inches in diameter. Weeds, brush, and dead wood debris were within the tree line and between the fallen tree and the tree line.

Photo 4. Downed tree location and position near tree line.

WEATHER

Weather Underground was utilized to check the weather conditions on the day of the incident. A weather station for the exact location was unavailable so MIFACE researchers utilized a nearby weather station's data. The weather on the day of the incident was approximately 78 degrees Fahrenheit with overcast skies and wind speeds of 0-7 mph. [Weather Underground]

INVESTIGATION

The employer wrote down the decedent's job assignments for the day/week on a sheet of yellow paper. On the day of the incident, the decedent's only task was to brush hog/mow the 10-acre parcel of ground where the incident occurred. The decedent was familiar with the parcel; he had mowed the area for four to five years. The owner could not recall the last time the decedent mowed the property.

The decedent began to mow a field section closest to the road entrance (Photo 3). After mowing approximately half the field, he stopped for lunch. The decedent and a homeowner chatted over lunch. The homeowner told the decedent he did not need to mow along his lot in the next field section because another neighbor would mow it.

Photo 5. Downed tree location and position near tree line. Note the branches forming a "Y" shape, one on the ground and the other laying across the tractor.

The decedent began to mow the second half of the parcel, starting at the perimeter. He had made at least one mowing pass around the field perimeter. While mowing near the tree line, he encountered the 25-30-foot long tree that had fallen into the field (Photo 4). The 2-foot diameter tree trunk had broken approximately 3-4 feet above the ground. The main branches of the tree, which were approximately 14 inches in diameter, formed a "Y" shape (Photo 5). The tree had fallen between other trees in the tree line.

Photo 6. Marks on tree caused by loader bucket and hydraulic arms from multiple attempts to push tree

Photo 7. Marks on tree caused by loader bucket and hydraulic arms from multiple attempts to push tree

Photo 8. Paint transfer marks on hydraulic arm caused by tree

Photo 9. Marks on hydraulic arm/cylinder caused by tree

Photographs 5-9 showed that the decedent made multiple attempts to push the tree, using the tractor/loader bucket as a bulldozer. He positioned the tractor nearly perpendicular to the mowing path. There were distinct marks along one of the tree's upper limbs as where it appeared he had pushed it and caused a gouge within the bark at a distance consistent with that of his bucket and the line made within the bark was also consistent with the thickness of the side of his bucket. Farther down the branch towards what would have been the top of the branch, another set of marks had orange paint

transfer that was consistent with the color of his tractor (Photo 6 and Photo 7). There were marks on the hydraulic arms of the tractor as well as where the hydraulics met the hydraulic cylinder (Photo 8 and Photo 9). Orange paint was visible on the tree and transferred in a width consistent with that of the hydraulic arms of the tractor.

The incident was unwitnessed. Three hypotheses of the sequence of events were developed based on photographic evidence.

- Hypothesis #1: One angled "Y" branch was on the ground and the other angled "Y" branch was elevated from the ground. The decedent backed the tractor and then moved forward, placing the bucket under the "Y" branch on the ground. He continued moving forward toward the tree line, the lower "Y" rolled, causing the upper Y branch to roll back toward the tractor. The branch struck the bucket and then continued over the bucket and tractor, striking the decedent and pinning him against the seat.
- Hypothesis #2: The bucket was in contact with the upper "Y" branch while the lower "Y" branch was on the ground as the decedent pushed the tree forward toward the tree line. As the lower "Y" branch rolled, the force exerted by the movement forward caused the upper "Y" branch to "pop off" the bucket and move up and over the hydraulic arms and tractor, coming to rest on the decedent, pinning him against the tractor seat.
- Hypothesis #3: The multiple attempts to push the tree out of the way may have been stopped by the small branch coming into contact with a stump and/or entanglement in wild grape vines (See soil disruption in Photo 5). The height of the bucket (we believe the loader level was not changed) suggested the decedent lifted while pushing the larger branch. The small branch may have been stopped by the stump in addition to the wild grape vines. The compressive force, as evidenced by the side bucket cuts on the large branch, was being applied at the angled part of the bucket. Friction no longer could withstand the compressed "Y" force and the large branch "released" to its natural position. The location of the resting point of the branch was consistent with an arc from the branch crotch rather than a full-length tree movement. The limb forcefully came over the bucket, hit the tilt arms low, slid up the arms and by that time there was enough release at the stump to allow some clockwise rotation (looking from the tree's stump) allowing it to clear the loader arms, then rotating counter clockwise to its natural position. Also, the deformation of both fenders suggested a downward force rather than a lateral force.

Approximately an hour and a half after the decedent had lunch with the homeowner, the homeowner did not hear the tractor running. The homeowner looked out and saw that the tractor was not moving, so the homeowner walked to tractor. The homeowner saw the decedent pinned by the tree limb in his tractor seat. The homeowner called for emergency response, indicating a tree had fallen on the decedent and he could not "get to him". When emergency responders arrived, they cut the tree limb to remove the decedent from the tractor seat. He was declared deceased at the scene.

At approximately 2:00 p.m., the responding police department called the decedent's employer. Later that day, the employer met with the decedent's family and a friend to try to reconstruct the sequence of events leading to the fatal incident.

MIOSHA CITATIONS

MIOSHA General Industry Safety and Health Division issued the following Other-than-Serious violations to the employer at the conclusion of its investigation.

OTHER-THAN-SERIOUS: RECORDING AND REPORTING OF OCCUPATIONAL INJURY AND ILLNESSES, ADM PART 11, RULE 408.22139(1): Fatalities. Within 8 hours after the death of an employee from a work-related incident, you must report the fatality by telephone to the MIOSHA toll-free central telephone number 1-800-858-0397.

> The incident was not reported within 8 hours after the death of an employee on *date. (MIFACE removed the specific date of injury.)*

OTHER-THAN-SERIOUS: INSPECTIONS AND INVESTIGATIONS, CITATIONS, AND PROPOSED PENALTIES, ADM PART 13, RULE 408.22325(2): Department representatives may take air, environmental, and material samples; take or obtain photographs related to the purpose of the inspection or investigation; employ other reasonable investigative techniques; and question privately any employer, owner, operator, agent, or employee of an establishment (See rule 1331 on trade secrets.)

> An employee interview was requested, but unable to be conducted due to the employer withholding the employee's name and contact information.

NOTE: Employee referenced above was a former employee (not currently working for the employer). The MIOSHA representative verbally asked for contact information for this former employee. The employer did not share the former employee's contact information with the MIOSHA representative over the phone. Upon employer appeal, MIOSHA vacated this citation as part of the settlement agreement.

CAUSE OF DEATH

The death certificate listed the cause of death as traumatic asphyxia. Post-mortem toxicology was negative for alcohol, illegal drugs, and prescription and non-prescription medications.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. The following unrecognized hazards were identified as key contributing factors in this incident:

- *Improper tool selection – a loader bucket was used rather than a grapple, brush rake or root rake to clear the fallen tree*
- *Tree length, weight, and configuration when pushing/lifting tree with tractor loader bucket*
- *Hazard awareness regarding the hazards, limitations, or potentially dangerous conditions associated with using the tractor/loader bucket to move the tree*

- *Brush, stump and dead wood debris in area where the decedent was attempting to push the tree*

Photo 10. Photo of grapple attachment. https://www.landpride.com/product-search/kubota-ce-attachments

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees use appropriate tractor attachments to perform needed work.

Discussion: It appeared that the decedent was using the tractor bucket as a bulldozer. Although a tractor equipped with a bucket can push materials around, a bucket is built to *lift* materials rather than *push* materials like a bulldozer.

Both a grapple (Photo 10) and a brush rake have vertical back structures. The grapple can close while a rake is designed to curl the brush over on itself leading to more brush per trip. The tines are run on or near the ground and then the load is lifted. Use of either a grapple or rake attachment would likely have prevented the fatality.

Recommendation #2: Farm employers should develop and implement a farm safety plan. The safety plan should include conducting a job safety analysis for each assigned task and training employees to ensure proper practices and procedures are implemented enabling the task to be performed safely.

Discussion: There are no legal requirements in Michigan for a farm to have a written safety plan. We recommend a written safety plan. The plan should identify the safety and health hazards for the farm, so hazard controls can be developed. A safety plan, that is communicated to all who work on the farm will help raise awareness of safety issues, promote safe work practices, and have additional benefits of increasing work efficiency and minimizing costs (a written safety plan may reduce worker compensation premiums). A safety plan should include, but not be limited to, how to conduct a job safety analysis, work rules, tractor use, non-routine task safety, as well as address other hazards unique to the agricultural operation.

A job safety analysis (JSA) is a technique to systematically evaluate job tasks to ensure they are performed safely. It involves identifying all potential hazards and hazardous situations that could occur when performing tasks by focusing on the relationship between the worker, the task, the tools and the work environment. MIOSHA has many resources, including standard guidance, sample plans for safety and health issues such as respirator use, and training material handouts. Michigan Farm Bureau, with funding from the MIOSHA Consultation, Education and Training (CET) Division grant, has developed a sample farm emergency preparedness safety plan as well as checklists for farm hazards. The information can be accessed at http://www.michfb.com/safety.

Based on the clear sight lines in the field, the decedent most likely saw the fallen tree in the next section of field to be mowed while he was mowing the field before lunch. There were other options rather than using the bucket to move the large tree. The field location was not far from the farm. At the farm were the grapple attachment and a chain saw; either of which could have minimized the hazard of moving the tree. The chain saw could have been used to cut the tree into smaller sections and the grapple attachment to lift the tree from the ground.

It is unknown if the decedent weighed the option to go back to the farm for a different attachment or chain saw. If the employer had provided training on conducting a job hazard analysis, the decedent may have considered "what could go wrong" and may have identified that the tree configuration, terrain, grape vines, may have posed a hazard when pushing the tree with the loader bucket.

Recommendation #3: Employers should provide regular training which addresses the hazards of task complacency with their workforce.

Discussion: The employer was concerned that the decedent did not recognize the risk due to complacency in tractor operation. Using a tractor equipped with a brush hog and loader is a common occurrence. Moving trees with a loader may not be a common task. The decedent had been operating tractors for many years.

The Kubota website warns operators of the hazards of complacency: "Carelessness, impatience and fatigue are your worst enemy around a tractor and its attachments". https://www.kubotausa.com/service-support/safety/attachment-safety Although workers may be aware of on-the-job, day-to-day hazards, they sometimes become complacent of such hazards. This complacency, especially when working with machinery, can lead to a serious, if not fatal incident. It is important for employers to warn all employees, including those employees with many years of experience, that complacency on the job, not recognizing hazards and following safe work practices, may cost them their life.

There are numerous examples of complacency safety training that employers can use at no cost on the Internet in the form of PowerPoint® or Tool Box Talks. Some examples include:

- Safety Toll Box Topics:
  - Complacency by David Stevens
  - Complacency by Glenn Matthiesen
- Complacency PowerPoints:
  - Safe Start – Safety Huddle: Supervisor Safety Leadership (UC Davis Safety Services)
  - Complacency (MiningQuiz.com)

ADDITIONAL RESOURCES

- The Wood Database: https://www.wood-database.com/
- NIOSH FACE Report #86-28: 24-Year-Old Manufactured Home Installer Electrocuted in Indiana. https://www.cdc.gov/niosh/face/in-house/full8628.html
- Safety Tool Box Topics: http://safetytoolboxtopics.com/
- SafeStart: https://safestart.com/

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REFERENCES

Weather Underground [2014]. Weather history for nearby weather station. The Weather Channel Interactive, Inc.

MIOSHA standards may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling 517-284-7740.

- Recording and Reporting of Occupational Injury And Illnesses, Adm Part 11
- Inspections and Investigations, Citations, And Proposed Penalties, Adm Part 13

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