



2022 Collegiate Turf Bowl Competition Study Guide

GCSAA would like to thank Leah Brilman, Ph.D., a member of the Turfgrass Breeders Association, and Gwen Stahnke, Ph.D., facilitators of the Turf Bowl, for their work updating and modifying the exam each year.

The 2022 Turf Bowl Competition will be a hybrid contest comprised of an in person exam and a virtual case study. The exam will consist of physical and visual identification of samples, and multiple-choice questions. For details on the case study, refer to the case study section of the study guide.

The study guide includes a list of resources you can use to prepare for the exam. We also recommend reaching out to local superintendents, local chapters or alumni for their help in preparing for the case study.

If you have any questions about the competition, contact Diana Kern at dkern@gcsaa.org or (785) 832-3600.

Eligibility

To participate in the GCSAA Collegiate Turf Bowl Competition, students must meet all of the following eligibility criteria:

- Must be currently enrolled in a turf program or have graduated at the end of the most recent fall semester but not yet entered a graduate program
- Be an active Student member with GCSAA
- Be a registered attendee at the GCSAA Education Conference and Golf Industry Show

Important Dates

January 14, 2022: Advisors send a list with the following information to Diana Kern at dkern@gcsaa.org. Onsite registration in San Diego will not be allowed.

- Student's name
- GCSAA membership number
- Email address
- If there are more than one team per school, then include the team the student will be on.

- Example: Chandler Bing, #123456, cbing@gcsaa.org, University of Kansas Team #1

January 21, 2022: Case Study PowerPoint and team photo for the Closing Celebration due to Diana Kern at dkern@gcsaa.org. Late submittals will not be accepted. Details on the case study requirements are included in the Case Study section of the study guide. Specifics for the requirements for the team photo are found on the Turf Bowl web page.

January 24 – 28, 2022: Virtual grading on case studies conducted.

February 9, 2022: Turf Bowl Kick Off Reception 3 – 5 pm in Student Pavilion on trade show floor. This is a come and go event for students to pick up participant swag from the Turf Bowl sponsor, John Deere. Light snacks will be available.

- Breakfast and welcome ceremony 7 – 8 am

February 10, 2022: Turf Bowl Competition 8 – 11 am

- The results will be announced at the Closing Celebration, 5:30 – 7 pm

Area of Study

Turfgrass Identification

- Identify turf specimens by their common names or traits.
- Know common name vs. scientific name.
- For specific turfgrass species, please see Addendum 1.

Turfgrass Growth and Development

- Identify parts of the grass plant.
- Know management and environmental factors that influence growth.
- Understand turfgrass physiology and how it is influenced by management practices.
- Understand plant growth regulators – Use and influence on biology

Turfgrass Soils and Soil Fertility

- Know greens construction, particle sizes, soils and fertility.
- Know of macronutrients and micronutrients, and their influence on growth.
- Soil types and classification
- Read and interpret a soil report

Weed Identification and Control

- Identify common weeds. Note: Any turfgrasses on list can also be weeds.
- Know herbicides, what weeds they control and mode of action.

- Know the life cycle of weeds and how management influences weed growth.
- Know seed labeling for crops and weeds.
- For specific weeds, please see Addendum 2.

Turfgrass Diseases

- Identify common diseases.
- Know environmental and management conditions, and the types of diseases that the conditions favor.
- Know common fungicides.
- Know grass species corresponding to various diseases.
- For specific diseases, please see Addendum 3.

Turfgrass Mathematics

- Calculate application rates of chemicals and fertilizers.
- Know quantities of sand and seed to use.
- Know how to correctly calibrate application equipment.
- Know how to use both the Metric and English units in calculations.

Turfgrass Insects

- Identify specimens of larval and adult forms of insects that attack turf.
- Know life cycles, preferred foods, feeding methods and other characteristics important in controlling insects.
- For specific insects, please see Addendum 4.

Irrigation

- Know how to evaluate turfgrass water needs and adjust various irrigation methods and rates accordingly to ensure the efficiency and effectiveness of the irrigation system.
- Calculate water usage.
- Know the basics of using reclaimed water for irrigation.

Water Management

- Understand how turfgrasses process water, including transpiration.
- Understand water terminology
- Know the symptoms of water stress in various turfgrasses and how to remedy.
- Know the causes of pesticide and nutrient runoff and how to prevent.

Equipment Identification Section

Teams will be asked answer questions on the safety practices for the 2700 PrecisionCut and E-Cut Hybrid Triplex Mower. The safety section of the operator's manual is in Addendum 5, at back of the study guide.

Case Study

You are the soil expert advising two superintendents on the results of the soil tests from their courses. Use the attached soil reports to answer the following questions.

Create a PowerPoint presentation with the questions asked and your answers. Your report should not exceed 20 slides. Use the notes to elaborate if needed.

Your presentation should only include your team number. No references to your schools or individual names should be made. This includes refraining from using any school logos, mascots or colors.

Questions for Soil Report 1:

- Looking at Sample 130-1 on the first soil report, what is the first thing you would advise the superintendent to do? You will ONLY use sample 130-1 – you can ignore the other three soil samples on this report.
- On the first soil report, which test should the superintendent use for P (weak Bray or Olsen) and why would you use that method interpretation over the other? Hint: the soil pH drives this selection.
- The superintendent asks about the CEC of the soil. Explain what CEC is, and why it matters. Is the CEC on this report high? The superintendent has someone trying to sell a product that increases CEC. Is this needed? Why or why not?

Questions for Soil Report 2:

A superintendent, whose course has Kentucky bluegrass, asks you questions these two soil tests. The superintendent is concerned with the results, especially the EC. Although the soil test may not say this, the units for EC are in ds m^{-2} .

- Identify what the EC numbers were telling the superintendent.
- Thinking about sodic, saline or saline-sodic soils, which situation does the superintendent potentially have (or is getting close to having)? What numbers help you come to that conclusion?

Soil Test 1

DATE OF REPORT: 04/30/04

SOIL ANALYSIS REPORT

PAGE 1

SAMPLE ID	LAB NUMBER	Organic Matter		Phosphorus		Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Soil pH	pH	Buffer Index	Hydrogen H meq/100g	Cation Exchange Capacity C.E.C. meq/100g	PERCENT CATION SATURATION (COMPUTED)			
		% Raising	ENR	P1 (Weak Bray)	NaHCO ₃ -P Olsen Method										K ppm	Mg ppm	Ca ppm	Na ppm
130-1	55931	4.0H	110	23M	14**	110L	460M	992VL	104L	4.7	6.2	9.7	19.1	1.5	19.8	25.9	50.5	2.4
130-2	55932	1.5L	60	27H	6**	41VL	569M	1154VL	185M	4.6	5.9	13.3	24.7	0.4	19.0	23.3	54.0	3.3
12-1	55933	3.5M	100	12L	11**	64L	471VH	841VL	87L	5.2	6.5	4.5	13.1	1.2	29.5	31.9	34.5	2.9
12-2	55934	2.8M	86	8VL	9**	29L	553VH	665VL	89M	5.3	6.6	3.7	12.1	0.6	37.7	27.5	31.0	3.2

** NaHCO₃-P unreliable at this soil pH

SAMPLE NUMBER	Nitrogen NO ₃ -N ppm	Sulfur SO ₄ -S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Excess Lime Rating	Soluble Salts meq/100g	Chloride Cl ppm	PARTICLE SIZE ANALYSIS			
											SAND %	SILT %	CLAY %	SOIL TEXTURE
130-1	5L	5L	0.3VL	3M	53VH	0.2VL	0.1VL	L	0.3L		44	25	31	CLAY LOAM
130-2	3VL	41VH	0.1VL	1VL	14M	0.2VL	0.1VL	L	0.6L		60	16	25	SANDY CLAY LOAM
12-1	2VL	5L	0.1VL	2L	50VH	0.1VL	0.3VL	L	0.2VL		42	36	23	LOAM
12-2	2VL	4L	0.1VL	1VL	53VH	0.1VL	0.2VL	L	0.1VL		40	35	25	LOAM

* CODE TO RATING: VERY LOW (VL), LOW (L), MEDIUM (M), HIGH (H), AND VERY HIGH (VH)
 ** ENR - ESTIMATED NITROGEN RELEASE
 *** MULTIPLY THE RESULTS IN ppm BY 2 TO CONVERT TO LBS. PER ACRE OF THE ELEMENTAL FORM
 **** MULTIPLY THE RESULTS IN ppm BY 4.6 TO CONVERT TO LBS. PER ACRE P₂O₅
 ***** MULTIPLY THE RESULTS IN ppm BY 2.4 TO CONVERT TO LBS. PER ACRE K₂O
 MOST SOILS WEIGH TWO (2) MILLION POUNDS (DRY WEIGHT) FOR AN ACRE OF SOIL 6-20 INCHES DEEP

Soil Test 1 continued

Organic Matter %		5.3	3.7
Saturation Index		1.8	1.7
pH		8.1	8.5
Buffer pH			
Soluble Salts		1.9	1.7
Electrical Conductivity		9.2	8.4
Excess Carbonates	M		M
Calcium (Ca)	TOTAL PPM	2934	2465
	AVAILABLE PPM	211	209
Magnesium (Mg)	TOTAL PPM	639	542
	AVAILABLE PPM	161	99
Ca:Mg Ratio	TOTAL PPM	4.6	4.5
Potassium (K)	TOTAL PPM	393	343
	AVAILABLE PPM	145	26
Sodium (Na)	TOTAL PPM	845	853
	AVAILABLE PPM	845	342
Cation Exchange Capacity		25	21
Percent Base	Ca %	59.4	57.5
Saturations	Mg %	21.6	21.1
	K %	4.1	4.1
	Na %	14.9	17.3
	H %	0	0

Soil Test 2

Organic Matter %	5.3	3.7
Saturation Index	1.8	1.7
pH	8.1	8.5
Buffer pH		
Soluble Salts	1.9	1.7
Electrical Conductivity	9.2	8.4
Excess Carbonates	M	M
Calcium (Ca)	TOTAL PPM AVAILABLE PPM	2934 2465 211 209
Magnesium (Mg)	TOTAL PPM AVAILABLE PPM	639 542 161 99
Ca:Mg Ratio	TOTAL PPM	4.6 4.5
Potassium (K)	TOTAL PPM AVAILABLE PPM	393 343 145 26
Sodium (Na)	TOTAL PPM AVAILABLE PPM	845 853 845 342
Cation Exchange Capacity		25 21
Percent Base	Ca %	59.4 57.5
Saturations	Mg %	21.6 21.1
	K %	4.1 4.1
	Na %	14.9 17.3
	H %	0 0

Resources

The following resources, along with GCSAA's monthly publication *Golf Course Management* magazine, are recommended as study resources. The textbooks may be available through your school library, local bookstore or through the **GCSAA Store online** at <https://www.gcsaastore.com/>.

1. **The Mathematics of Turfgrass Maintenance (Third Edition)** – Michael Agnew and Nick Christians
2. **Mathematics for the Green Industry: Essential Calculations for Horticulture and Landscaping Professionals** - Michael Agnew, Nancy Agnew, Ann Marie VanDerZanden and Nick Christians
3. **Turfgrass Management (1st Edition)** – A.J. Turgeon and J.E. Kaminski, <https://turfpath.com/book/>
4. **Fundamentals of Turfgrass Management** – Nick Christians
5. **Turf Management for Golf Courses (2nd Edition)** – James B. Beard
6. **Salt-Affected Turfgrass Sites: Assessment and Management** – R.N. Carrow and R.R. Duncan
7. **Managing Turfgrass Pests** – Thomas L. Watschke, Peter H. Dernoden and David J. Shetlar
8. **Controlling Turfgrass Pests (2nd Edition)** – Thomas W. Fermanian, Malcom C. Shurtleff, Roscoe Randell, Henry T. Wilkinson and Philip L. Nixon
9. **Creeping Bentgrass Management: Summer Stresses, Weeds and Selected Maladies** – Peter H. Dernoden
10. **Human Resource Management for Golf Course Superintendents, ch. 6** – Bob Milligan and Tom Maloney
11. **Superintendents Handbook of Financial Management, ch. 2, 3, 5, and 9** – Ray Schmidgall
12. **The Turf Problem Solver: Case Studies and Solutions for Environmental, Cultural and Pest Problems** – A.J. Turgeon and J.M. Jr. Vargas (Dec. 2, 2005)
13. **Identifying Turf and Weedy Grasses of the Northern United States** – D. Pedersen and T. Voight Illinois Pocket ID series University of Illinois Extension pubsplus.uiuc.edu
14. **Turfgrass Identification Tool – Purdue University Turfgrass Science Department of Agronomy (vernation)** - agry.purdue.edu/turf/tool/index.html
15. **Turfgrass Identification (vernation)**- David Gardner, The Ohio State University bucketurf.osu.edu/pdf/01_turfgrass_identification.pdf

16. Best Management Practices for Turfgrass Water Conservation
[commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/1650 BMP H2O.htm](http://commodities.caes.uga.edu/turfgrass/georgiaturf/Publicat/1650_BMP_H2O.htm)
17. Best Management Practices: Where Leadership & Action Intersect – GCSAA
<https://www.gcsaa.org/environment/bmp-planning-guide>
18. Golf Course Environmental Profile eifg.org/research/golf-course-environmental-profile

Addendum 1

Cool Season Grasses

Common name	Scientific name
1. Kentucky bluegrass	<i>Poa pratensis</i>
2. Perennial ryegrass	<i>Lolium perenne</i>
3. Tall fescue	<i>Festuca arundinacea</i> = <i>Schedonorus arundinaceus</i> = <i>Lolium arundinaceum</i>
4. Hard fescue	<i>Festuca brevipila</i> (<i>F. trachyphylla</i>)
5. Chewings fescue	<i>Festuca rubra</i> ssp. <i>commutata</i> (ssp. <i>fallax</i>)
6. Creeping bentgrass	<i>Agrostis stolonifera</i>
7. Colonial bentgrass	<i>Agrostis capillaris</i>
8. Strong creeping red fescue	<i>Festuca rubra</i> ssp. <i>rubra</i>
9. Slender creeping red fescue	<i>Festuca rubra</i> ssp. <i>littoralis</i>
10. Velvet bentgrass	<i>Agrostis canina</i>
11. Rough bluegrass	<i>Poa trivialis</i>
12. Annual bluegrass	<i>Poa annua</i>
13. Annual ryegrass	<i>Lolium multiflorum</i>

Warm Season grasses

14. Japanese / Korean lawngrass	<i>Zoysia japonica</i>
15. Manilla grass	<i>Zoysia matrella</i>
16. Hybrid bermudagrass	<i>Cynodon dactylon</i> X <i>C. transvaalensis</i>
17. Common bermudagrass	<i>Cynodon dactylon</i>
18. Centipedegrass	<i>Eremochloa ophiuroides</i>
19. Seashore paspalum	<i>Paspalum vaginatum</i>
20. Buffalograss	<i>Bouteloua dactyloides</i>
21. St. Augustinegrass	<i>Stenotaphrum secundatum</i>
22. Kikuyugrass	<i>Pennisetum clandestinum</i>

- 23. Bahiagrass
- 24. Carpetgrass

Paspalum notatum
Axonopus affinis

Addendum 2

Weeds

Alkaligrass
Barnyardgrass / Watergrass
Bedstraw / Catchweed
Bindweed, Field
Brassbuttons, Souther
Buttonweed, Virginia
Carpetweed
Carrot, Wild
Chess, Soft
Chickweed, Common
Chickweed, Mouseear
Chicory
Clover, White
Crabgrass, Hairy (Large)
Crabgrass, Smooth
Cudweed, purple
Dallisgrass (smooth paspalum)
Dandelion, False /spotted catsear
Dandelion
Dichondra
Dock, Curly
Downy Brome / cheatgrass
English Daisy
Foxtail, Yellow (pigeon / bristle grass)
Foxtail , Green
Garlic , Wild
Geranium, Carolina / dovefoot
Goosegrass/Silver Crab/ Crowfoot
Ground Ivy (Creeping Charlie/Jenny)
Hawkweed
Henbit
Johnsongrass
Kikuyugrass
Knotweed, Prostrate / Common
Kochia
Kyllinga, Annual / Fragrant

Puccinella distans
Echinochloa crus-galli
Galium aparine
Convolvulus arvensis
Cotula australis
Diodia virginia
Mollugo verticillata
Daucus carota
Bromus hordeaceus
Stellaria media
Cerastium vulgatum
Cichorium intybus
Trifolium repens
Digitaria sanguinalis
Digitaria ischaemum
Gnaphalium purpureum
Paspalum dilatatum
Hypochoeris radicata
Taraxacum officinale
Dichondra repens
Rumex crispus
Bromus tectorum
Bellis perennis
Setaria glauca (pumilla ssp pumilla)
Setaria viridis
Allium vineale
Geranium ssp.
Elusine indica
Glechoma hederacea
Hieracium pratense
Lamium amplexicaule
Sorghum halapense
Pennisetum clandestinum
Polygonum aviculare
Kochia scoparia
Kyllinga odorata

Kyllinga, Green / Perennial	<i>Kyllinga brevifolia</i>
Lambsquarter	<i>Chenopodium album</i>
Lettuce, Prickly	<i>Lactuca serriola</i>
Mallow, Common	<i>Malva neglecta</i>
Medic, Black	<i>Medicago lupulina</i>
Moss, silvery thread	<i>Bryum argenteum</i>
Mullein, Common	<i>Verbascum thapsus</i>
Nimblewill	<i>Muhlenbergia schreberi</i>
Nutsedge, Purple	<i>Cyperus rotundus</i>
Nutsedge, Yellow	<i>Cyperus esculentus</i>
Oats, Wild	<i>Avena fatua</i>
Orchardgrass	<i>Dactylis glomerata</i>
Pearlwort	<i>Sagina apetala (procumbens)</i>
Pennywort / dollarweed	<i>Hydrocotyle umbellata</i>
Peppergrass / pepperweed	<i>Lepidium virginicum</i>
Pigweed, Prostrate	<i>Amaranthus blitoides</i>
Pineapple Weed / wild chamomile	<i>Matricaria discoidea</i>
Plantain, Broadleaf	<i>Plantago major</i>
Plantain, Buckhorn / Narrowleaf	<i>Plantago lanceolata</i>
Puncture Vine / goatshead	<i>Tribulus terrestris</i>
Purslane, common	<i>Portulaca oleracea</i>
Quackgrass	<i>Elytrigia repens</i>
Rattail fescue	<i>Vulpia myuros</i>
Redtop	<i>Agrostis gigantean (alba)</i>
Salsify, Western	<i>Tragopogon dubius</i>
Sandbur/ grassbur	<i>Cenchrus incertus</i>
Sedge, Annual	<i>Cyperus compressus</i>
Shepherd's Purse	<i>Capsella bursa-pastoris</i>
Signalgrass	<i>Urochloa subquadripara</i>
Smartweed, Spotted (Ladysthumb)	<i>Polygonum persicaria</i>
Smutgrass	<i>Sporobolus indicus</i>
Sorrell, Red / Sheeps	<i>Rumex acetosella</i>
Speedwell, creeping	<i>Veronica filiformis</i>
Spurge, Prostrate / Spotted	<i>Chamaesyce maculata (Euphorbia)</i>
Star of Bethlehem	<i>Ornithogalum umbellatum</i>
Strawberry, Wild	<i>Fragaria virginiana</i>
Swinecress	<i>Coronopus didymus</i>
Timothy	<i>Phleum pratense</i>
Thistle, Bull	<i>Cirsium vulgare</i>
Thistle, Canada	<i>Cirsium arvense</i>
Thistle, Musk	<i>Carduus nutans</i>

Torpedograss
Velvetgrass, German
Violet
Woodsorrel, Creeping
Woodsorrel, Yellow (Oxalis)
Yarrow
Yellowcress

Panicum repens
Holcus mollis
Viola ssp.
Oxalis corniculata
Oxalis stricta
Achillea millefolium
Rorippa palustris

Addendum 3

Bacterial Diseases

Bacterial wilt
Bacterial etiolation and decline

Xanthomonas translucens
Acidovorax avenae

Fungal Diseases

Anthraxnose
Ascochyta leaf blight
Bermudagrass decline
Blister smut
Brown patch (C3) & large patch (C4)
Brown ring patch
Brown stripe
Cladosporium eyespot
Copper spot
Coprinus snow mold
Crown rust
Curvularia blight
Dead spot
Dollar spot

Colletotrichum cereale, *C. eremochloae*
Ascochyta avenae
See Root decline of warm-season grasses
Jamesdicksonia dactylidis
Rhizoctonia solani
Waitea circinata var. *circinata*
Mycosphaerella recutita
Cladosporium phlei
Gloeocercospora sorghi
Coprinopsis psychromorbida
Puccinia coronata
multiple *Curvularia* sp.
Ophiosphaerella agrostis
Clariireedia is new genus
Clariireedia homeocarpa on *Festuca rubra*,
UK only
Clariireedia bennettii on mostly cool season
grasses, UK, Netherlands, USA
Clariireedia monteithiana on Warm-season
grasses; found worldwide
Clariireedia jacksonii on cool-season grasses;
found worldwide
multiple *Drechslera* and *Mariellottia* sp.
Neotyphodium coenophialum, *N. lolii*,
Epichloe typhina
Species of Agaricales and Gastromycetales,
mostly in the genera *Agaricus*, *Calvatia*,
Chlorophyllum, *Clitocybe*, *Lepiota*,

Drechslera leaf spots and melting-out
Endophytic fungi

Fairy ring

Flag smut	<i>Lycoperdon</i> , <i>Marasmius</i> , <i>Scleroderma</i> , and <i>Tricholoma</i> .
Gray leaf spot	<i>Urocystis agropyri</i>
Gray snow mold	<i>Pyricularia grisea</i>
Leaf and sheath spot	<i>Typhula incarnata</i>
<i>oryzae</i>	<i>Waitea circinata</i> var. <i>zeae</i> , <i>W. circinata</i> var.
Leaf rust	<i>Puccinia brachypodii</i>
Leptosphaerulina leaf blight	<i>Leptosphaerulina trifolii</i>
Mastigosporium leaf spot (leaf fleck)	<i>Mastigosporium rubricosum</i>
Microdochium patch	<i>Microdochium nivale</i>
Necrotic ring spot	<i>Ophiosphaerella korrae</i>
Phyllosticta leaf blight	Multiple species of <i>Phyllosticta</i> and
<i>Guignardia</i>	
Physoderma leaf spot and leaf streak	<i>Physoderma graminis</i>
Pink patch and cream leaf blight	<i>Limonomyces roseipellis</i>
Pink snow mold	See Microdochium patch
Powdery mildew	<i>Blumeria graminis</i>
Pythium foliar blight	<i>Pythium aphanidermatum</i> , <i>P. graminicola</i> , <i>P. ultimum</i> , Several other <i>Pythium</i> species
Pythium root and crown rot	<i>Pythium aristosporum</i> , <i>P. arrhenomanes</i> , <i>Pythium volutum</i> , several other <i>Pythium</i> species
Pythium root dysfunction:	<i>Pythium volutum</i> , <i>P. arrhenomanes</i> , <i>P.</i> <i>aristosporum</i> , several other <i>Pythium</i> species
Rapid blight	<i>Labyrinthula terrestris</i>
Red thread	<i>Laetisaria fuciformis</i>
Root decline of warm-season grasses	<i>Gaeumannomyces graminis</i> var. <i>graminis</i> , <i>Magnaporthiopsis incrustans</i> , <i>G. wongoonoo</i>
Septoria leaf spot	several <i>Septoria</i> species
Snow scald	<i>Sclerotinia borealis</i>
Southern blight	<i>Athelia rolfsii</i>
Speckled snow mold	<i>Typhula ishikariensis</i>
Spring dead spot	<i>Ophiosphaerella narmari</i> , <i>O. korrae</i> , <i>O.</i>
<i>herpotricha</i>	
Stem rust	<i>Puccinia graminis</i>
Stripe rust	<i>Puccinia striiformis</i>
Stripe smut	<i>Ustilago striiformis</i>
Summer patch	<i>Magnaporthiopsis poae</i>
Take-all patch	<i>Gaeumannomyces graminis</i>
Tar spot	<i>Phyllachora</i> spp.
Thatch collapse	<i>Sphaerobolus stellatus</i>
Yellow patch	<i>Rhizoctonia cerealis</i>
Yellow tuft	<i>Sclerophthora macrospora</i> .
Yellow ring	<i>Trechispora alnicola</i>

Nematodes, Parasitic

Awl: *Dolichodorus* spp. Cobb

Cyst: *Heterodera* spp. Schmidt

Dagger: *Xiphinema* spp. Cobb

Lance: *Hoplolaimus* spp. Daday

Lesion: *Pratylenchus* spp. Filipjev

Needle: *Longidorus* spp. (Micoletzky) Thorne & Swanger

Pin: *Paratylenchus* spp.

Pseudo-root knot: *Hypsoperine* spp. Sledge & Golden

Ring: *Criconemella*, *Criconemoides*, *Macroposthonia*, and *Mesocriconema* spp.

Root gall: *Subanguina* spp.

Root knot: *Meloidogyne* spp. Goeldi

Sheath: *Hemicycliophora* spp.

Sheathoid: *Hemicriconemoides* spp.

Spiral: *Helicotylenchus* spp. Steiner

Sting: *Belonolaimus* spp. Steiner

Stubby root: *Paratrichodorus* and *Trichodorus* spp.

Stylet or stunt: *Tylenchorhynchus* spp. Cobb

Miscellaneous Diseases or Disorders

Black Layer: A

Anaerobic soil plus blue-green algae and/or sulfate-reducing bacteria

Slime Molds (superficial, not pathogenic):

Mucilago crustacea

: *Didymium squamulosum*

: *Physarum cinereum*.

: Species of *Physarum* and *Fuligo*

Addendum 4:

Insects

Annual Bluegrass Weevil

Billbugs

- bluegrass billbug
- hunting billbug

Black Turfgrass Ataenius

Chinchbugs

- hairy chinchbug

- southern chinchbug

Craneflies

- European crane fly (*Tipula paludosa*)
- "common" crane fly (*Tipula oleraceae*)

Caterpillars and adults

- armyworm
- black cutworm
- fall armyworm
- winter cutworm

Mole Crickets

- southern mole cricket
- tawny mole cricket

Red Imported Fire Ant

Turfgrass Ant

White Grubs and Adult Beetles

- Asiatic garden beetle
- European chafer
- Japanese beetle
- masked chafer (southern)
- masked chafer (northern)
- oriental beetle

Wasps

- Scoliid
- Cicada Killers
- yellow jacket
- Paper wasp

Beneficials

Honey bees

Assassin bugs

Ground beetle

Lacewing

Praying Mantis

Addendum 5

2700 PrecisionCut™, 2700 E-Cut™ Hybrid, 2750 PrecisionCut™ and 2750 E- Cut™ Hybrid Triplex Mower

(Serial No. 020001 -)



JOHN DEERE

OPERATOR'S MANUAL

PrecisionCut™ and E-Cut™ Hybrid Triplex Mower

OMUC27465 ISSUE A1 (ENGLISH)

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

If this product contains a gasoline engine:

WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

The State of California requires the above two warnings.

Additional Proposition 65 Warnings can be found in this manual.

John Deere Turf Care

North American Edition
Printed in U.S.A.



* D C Y *



* O M U C 2 7 4 6 5 *

Introduction

Thank You for Purchasing a John Deere Product

We appreciate having you as a customer and wish you many years of safe and satisfied use of your machine.

MX00654,000020B-19-10MAY17

Using Your Operator's Manual

This manual is an important part of your machine and should remain with the machine when you sell it.

Reading your operator's manual will help you and others avoid personal injury or damage to the machine. Information given in this manual will provide the operator with the safest and most effective use of the machine. Knowing how to operate this machine safely and correctly will allow you to train others who may operate this machine.

If you have an attachment, use the safety and operating information in the attachment operator's manual, along with the machine operator's manual, to operate the attachment safely and correctly.

This manual and safety signs on your machine may also be available in other languages (see your authorized dealer to order).

Sections in your operator's manual are placed in a specific order to help you understand all the safety messages and learn the controls so you can operate this machine safely. You can also use this manual to answer any specific operating or servicing questions. A convenient index located at the end of this book will help you find needed information quickly.

The machine shown in this manual may differ slightly from your machine, but will be similar enough to help you understand our instructions.


RIGHT-HAND and LEFT-HAND sides are determined by facing in the direction that the machine will travel when going forward. When you see a broken line (-----), the item referred to is hidden from view.

Before delivering this machine, your dealer performed a predelivery inspection to ensure best performance.

MX00654,000020C-19-05JUN17

Special Messages

Your manual contains special messages to bring attention to potential safety concerns and machine damage, as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

 **CAUTION: Avoid injury! This symbol and text highlight potential hazards or death to the operator or bystanders that may occur if the hazards or procedures are ignored.**

IMPORTANT: Avoid damage! This text is used to tell the operator of actions or conditions that might result in damage to the machine.

NOTE: General information is given throughout the manual that may help the operator in the operation or service of the machine.

MX00654,000020D-19-05JUN17

Service Literature

If you would like to purchase a copy of the Parts Catalog or Technical Manual for this machine, visit The John Deere Technical Information Store at:

<https://techpubs.deere.com/>

or call:

- **U.S. & Canada:** 1-800-522-7448.
- **All Other Regions:** Your John Deere dealer.

TH84124,0000199-19-05FEB20

Parts

We recommend John Deere quality parts and lubricants, available at your John Deere dealer.

When you order parts, your John Deere dealer needs the serial number or product identification number (PIN) for your machine or attachment. These are the numbers that you recorded in the Product Identification section of this manual.

Order Service Parts Online

Visit <http://JDParts.deere.com> for your Internet connection to parts ordering and information.

TC00531,00000E9-19-06MAR15

Safety Labels Text

Safety Label Location



A—CAUTION UC15819
B—WARNING UC12692

C—MACHINE CLEAN OUT UC15294
D—DANGER MT6517

TCT100696—UN—11APR19

OOU2004,0000A5A-19-11APR19

Understanding the Machine Safety Labels



MXAL42363—UN—22MAY13

The machine safety labels shown in this section are placed in important areas on your machine to draw attention to potential safety hazards. DANGER or WARNING safety labels are located near specific hazards.

The operator's manual also explains any potential safety hazards whenever necessary in special safety

messages that are identified with the word, CAUTION, and the safety-alert symbol.

On your machine safety labels, the words DANGER, WARNING, and CAUTION are used with this safety-alert symbol. DANGER identifies the most serious hazards:

- DANGER; The signal word DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING; The signal word WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION; The signal word CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices

Safety Labels Text

associated with events which could lead to personal injury.

Replace missing or damaged safety labels. Use this operator's manual for correct safety label placement.

There can be more safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

French or Spanish Safety Labels and Operator's Manual

Operator's manuals and safety labels with content in French or Spanish are available for this machine through authorized John Deere dealers. See your John Deere dealer.

NOTE: Both text and no-text labels are shown. Your machine is only equipped with one of these types of labels.

MP47322,00F4601-19-24APR19

CAUTION

HELP AVOID INJURY



TCT016539—UN—22AUG18

- Operator training required.
- Read operator's manual.
- Know all controls.
- Do not operate the machine without guards, shields, and safety devices in place and working.
- Look behind before backing.
- Keep people a safe distance away.
- Stay clear of power driven parts.
- Do not operate where machine could tip.
- Never carry riders.
- Before leaving machine:
 - Stop engine.
 - Set park brake.
 - Remove key.

MK71445,00000A1-19-12SEP18

DANGER



TCT016544—UN—22AUG18

- To avoid injury from rotating blades, stay clear of reel.
- Shut off engine before servicing, lubricating or removing cutting unit.

MK71445,00000A6-19-12SEP18

CAUTION



TCT016540—UN—22AUG18

Avoid equipment fires.

Accumulation of grass and other debris on or near hot or moving parts can cause a fire.

Inspect machine before, during, and after use.

Shut off engine and allow machine to cool before cleaning.

Inspect and clean the entire machine and pay special attention to these locations:

1. Muffler and exhaust system
2. Around brakes
3. Engine and engine screens

MK71445,00000A4-19-12SEP18

Safety Labels Text

DANGER



TCAL24845—UN—29MAY12

Use Seat Belt

- To avoid injury from crushing, always wear seat belt. Do not jump from machine.

OUC2005.0000009-19-23AUG13

Canadian Electromagnetic Compatibility (EMC) Compliance

This spark ignition system complies with CAN ICES-2/ NMB-2.

OUMX068.0000586-19-12SEP18

Certification

Your product has been certified for compliance with American National Standards Institute B-71.4, Safety Specifications for Commercial Turf Care Equipment.

OUMX068.0000587-19-03FEB14

Safety Labels No-Text

Safety Label Location



A—HELP AVOID INJURY UC15820
B—AVOID CRUSHING TCU23487

C—AVOID INJURY FROM EQUIPMENT FIRES TCU34231
D—AVOID INJURY FROM ROTATING BLADES MT6732

TCT100697—UN—11APR19

MK71445,00000A3-19-11APR19

Understanding the Machine Safety Labels without Text



TCT005498—UN—11SEP12

At several important places on this machine, safety signs are affixed which signify potential danger. The hazard is identified by a pictorial in a warning triangle. An adjacent pictorial provides information on how to

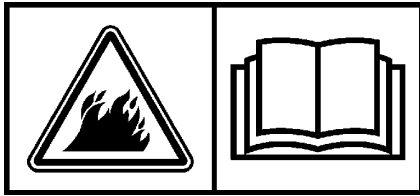
avoid personal injury. These safety signs, their placement on the machine, and a brief explanatory text are shown in this Safety section.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

MX00654,0000389-19-21JUN18

Safety Labels No-Text

Avoid Injury From Equipment Fires



MXT018019—UN—04MAY16

Avoid equipment fires.

Accumulation of grass and other debris on or near hot or moving parts can cause a fire.

Inspect machine before, during, and after use.

Shut off engine and allow machine to cool before cleaning.

Inspect and clean the entire machine and pay special attention to these locations:

1. Muffler and exhaust system
2. Around brakes
3. Engine and engine screens

OUMX068,00010F5-19-25JUL16

Avoid Injury from Rotating Blades



TCT008006—UN—26JUL13

- To avoid injury from rotating blades, stay clear of reel.
- Shut off engine before servicing, lubricating or removing cutting unit.

OOU2005,000004E-19-23AUG13

Help Avoid Injury



TCT100698—UN—10APR19

- Read Operator's Manual before operating machine.
- Keep people a safe distance away.
- Do not drive where machine could slip, tip, or rollover.

- Avoid tipping by identifying slopes for safe operation.
- Before leaving operator station:
 - Stop engine.
 - Set park brake.
 - Remove key.

MK71445,0000204-19-11APR19

Avoid Crushing



TCAL24857—UN—29MAY12

- To avoid injury from crushing, always wear seat belt. Do not jump from machine.
- Read the Operator's Manual.
- Always use seat belt.
- Avoid tipping by identifying slopes for safe operation.

OOU2005,000002A-19-23AUG13

Safety

Operator Training Required

- Read the operator's manual, attachment manuals, and other training material carefully. If the operator or mechanic cannot read English, it is the responsibility of the owner to explain this material to them. This publication is available in other languages.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner of the machine is responsible for training the users.
- Age, physical ability, and mental capacity can be factors in equipment-related injuries. Operators must be mentally and physically capable of operating the machine properly and safely.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people, or property.
- Operate the machine in an open, unobstructed area under the direction of an experienced operator.
- Test drive area with attachment lowered, if equipped, but not running. Slow down when you travel over rough ground.

OUC1082,000657E-19-15MAY18

Preparation

- Evaluate the terrain and determine what accessories and attachments are required to perform the job safely and properly. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including, safety glasses, and hearing protection. Long hair, loose clothing, or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used. Remove all objects such as rocks, toys, and wire which can be thrown by the machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
 - a. Use only an approved container.
 - b. Never remove gas cap or add fuel when engine is running. Do not smoke.
 - c. Never refuel or drain the machine indoors.
- Check that the operator presence controls, safety switches, and shields are attached and functioning properly. Do not operate machine unless all safety devices are functioning properly.

OUC1082,000657E-19-15MAY18

Operating Safely

- Never run an engine in an enclosed area where dangerous carbon monoxide fumes can collect.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Only start engine from the operator's position. Use seat belts if provided.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. For this machine, drive up and down hillsides, not across. Turf conditions can affect the machine's stability. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never raise cutting units while engaged.
- Never operate without guards securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor setting or overspeed the engine. Operating the engine at excessive speed can increase the hazard of personal injury.
- Stop on level ground, lower implements, disengage drives, engage parking brake, and shut off engine before leaving the operator's position for any reason including emptying the grasscatchers or clearing blockages.
- Stop equipment and inspect cutting units after striking objects or if an abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the cutting units.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers and keep pets and bystanders away.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop cutting units if not mowing. Watch for traffic when operating near or crossing roadways.
- Do not operate the machine while under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into or off of a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
- Inspect machine before you operate. Be sure hardware is tight. Repair or replace damaged, badly worn, or missing parts. Be sure guards and shields are in good condition and fastened in place. Make any necessary adjustments before you operate.
- Keep safety labels visible when installing accessories and attachments.

Safety

- Do not wear radio or music headphones. Safe service and operation require your full attention.
- When machine is left unattended, stored, or parked, lower the cutting units unless a positive mechanical lock is used.

OUO2005.0000212-19-05FEB13

Using a Spark Arrestor

The California Public Resources Code, Section 4442.5 provides as follows:

No person shall sell, offer for sale, lease, or rent to any person any internal combustion engine subject to Section 4442 or 4443, and not subject to Section 13005 of the Health and Safety Code, unless the person provides a written notice to the purchaser or bailee, at the time of sale or at the time of entering into the lease or rental contract, stating that it is a violation of Section 4442 or 4443 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrestor, as defined in Section 4442, maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire pursuant to Section 4443. Cal. Pub. Res. Code 4442.5.

Other states or jurisdictions may have similar laws. A spark arrestor for your machine may be available from your authorized dealer. An installed spark arrestor must be maintained in good working order by the operator.

OUO2005.0000213-19-05JUL17

Checking Mowing Area



MXAL41932—UN—22MAY13

- Clear mowing area of objects that might be thrown. Keep people and pets out of mowing area.
- Low-hanging branches and similar obstacles can injure the operator or interfere with mowing operation. Before mowing, identify potential obstacles, such as low-hanging branches, and trim or remove those obstacles.
- Study mowing area. Set up a safe mowing pattern. Do not mow where traction or stability is doubtful.
- Test drive area with mower lowered (if equipped) but not running. Slow down when you travel over rough ground.
- Survey all mowing sites to determine which slopes are safe for machine operation and which slopes

should be maintained through other maintenance techniques.

MP47322,00F4617-19-05JUL17

Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Disengage mower blades or any other attachments.
3. Lower attachments to the ground.
4. Lock the park brake.
5. Stop the engine.
6. Remove the key.
7. Wait for engine and all moving parts to stop before you leave the operator's seat.
8. Close fuel shut-off valve, if your machine is equipped.
9. Disconnect the negative battery cable or remove the spark plug wire(s) (for gasoline engines) before servicing the machine.

OUO1023.0000035-19-21FEB13

Rotating Blades Are Dangerous



TCT012793—UN—06JUL15

- Rotating cutting units can cut off arms and legs, and throw objects. Failure to observe safety instructions could result in serious injury or death.
- Keep hands, feet, and clothing away from rotating cutting units when engine is running.
- Be alert at all times, drive forward and in reverse carefully. People, especially children can move quickly into the mowing area before you know it.
- Before backing up, stop cutting units and look down and behind the machine carefully, especially for children.
- Do not mow in reverse.
- Shut off cutting units when you are not mowing.
- Park machine safely before leaving the operator's station for any reason including emptying the grass catchers or unplugging the chute, if equipped.
- Keep all parts of the body away from the cutting edges. Residual hydraulic pressure or other stored

Safety

energy source in the system can cause cutting unit rotation when the blockage is released.

- If applicable, use a long-handled brush when applying reel sharpening compound.
- Keep bystanders away from cutting units when adjusting or servicing.
- Always wear gloves when manually rotating cutting units.
- Manually rotating one cutting unit can cause another to rotate if operated hydraulically.
- The cutting unit should stop in approximately five seconds when disengaged. If you believe that your cutting units may not be stopping in that period of time, take your machine to your authorized dealer where they can safely check and service your machine.

OUC2005,0000216-19-15,JUL15

Protect Children

- Death or serious injury can occur when young children associate having fun with a lawn mowing machine simply because someone has given them a ride on a machine.
- Children are attracted to lawn mowing machines and mowing activities. They don't understand the dangers of rotating blades or the fact that the operator is unaware of their presence.
- Children who have been given rides in the past may suddenly appear in the mowing area for another ride and be run over or backed over by the machine.
- Tragic accidents with children can occur if the operator is not alert to the presence of children, especially when a child approaches a machine from behind. Before and while backing up, stop mower blades and look down and behind the machine carefully, especially for children.
- Never carry children on a machine or attachment, even with the blades off. Do not tow children in a cart or trailer. They can fall off and be seriously injured or interfere with safe machine operation.
- Never use the machine as a recreational vehicle or to entertain children.
- Never allow children or an untrained person to operate the machine. Instruct all operators not to give children a ride on the machine or in an attachment.
- Keep children indoors, out of the mowing area, and in the watchful eye of a responsible adult, other than the operator, when a mower is being operated.
- Stay alert to the presence of children. Never assume that children will remain where you last saw them. Turn the machine off if a child enters the work area.

OUC2005,0000217-19-05,FEB13

Avoid Tipping



TCAL42360—UN—08MAR13

Identify Slopes for Safe Operation

- Establish your own special procedures and rules for operating on slopes. These procedure must include a survey of all mowing sites to determine which slopes are safe for machine operation. Always use common sense and good judgement when performing this survey.
- Lay a straight piece of sturdy lumber 1.2 m (4 ft) long on the slope and measure the angle of the slope with an angle indicator or protractor level.
- Never mow or operate machine on slope angles greater than 25°.
- Exceeding the maximum recommended slope angle of 25° increases the risk of rollover accidents that can result in serious injury or death.
- Always consider potential turf conditions and slope angles when determining the risk of loss-of-control and tip-over accidents.
- On slope angles of 14° or less the risk of rollover is low, but as the slope angle increases to the John Deere recommended maximum of 25° the risk increases to a moderate level.

Operate Safely on Slopes

- Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. Operation on all slopes requires extra caution.
- Use lower speeds while mowing and operating on slopes.
- If you feel uneasy on a hillside, do not mow it.
- Mow up and down slopes, not across.
- Watch for holes, ruts, bumps, rocks, or other hidden objects. Uneven terrain could overturn the machine. Tall grass can hide obstacles.
- Choose a low ground speed so you will not have to stop or shift while on a slope.
- Rollover can occur before the tires lose traction.
- Use caution if mowing when grass is wet or slippery. Tires may lose traction. Tires may lose traction or slip on slopes even though the brakes are functioning properly.
- Avoid starting, stopping or turning on a slope. If the tires lose traction, disengage the cutting units and proceed slowly, straight down the slope.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction, which could cause the machine to roll over.

Safety

- Do not mow near drop-offs, ditches, embankments, or bodies of water. The machine could suddenly roll over if a wheel goes over the edge or the edge caves in. Leave a safety area between the machine and any hazard.
- Drive machine very slowly and avoid quick stops when cutting units are removed.
- Keep cutting units lowered to ground while operating on slopes. Raising cutting units while operating on slopes can cause machine to become unstable.
- Transport machine with cutting units lowered to improve stability.

MK71445.0000001-19-12SEP18

Use Seat Belt Properly



TCAL25959—UN—24MAY12

- Use a seat belt when you operate with a Roll-Over Protective Structure (ROPS) to minimize chance of injury from an accident, such as an overturn.
- Never modify, disassemble or attempt to repair the seat belt.
- Replace entire seat belt if mounting hardware, buckle, belt, or retractor show signs of damage.
- Inspect seat belt and mounting hardware at least once a year. Look for signs of loose hardware or belt damage, such as cuts, fraying, extreme or unusual wear, discoloration, or abrasion. Replace only with John Deere-approved replacement parts.
- Layers of heavy clothing can interfere with proper positioning of the seat belt and can reduce the effectiveness of the seat belt.

OOU2005.0000219-19-05FEB13

Keep ROPS Installed Properly

- Never operate the machine without the ROPS installed.
- Make certain all parts of the ROPS are installed correctly if the ROPS structure is loosened or removed for any reason. All ROPS hardware should be tightened to the proper torque per manufacturer's recommendations.
- Any alteration of the ROPS must be approved by the manufacturer. The protection provided by the ROPS will be impaired if the ROPS is subjected to structural damage, is involved in an overturn incident, or is in any way altered by welding, bending, drilling, or cutting.
- The seat and foot platform are part of the ROPS

safety zone. Replace only with John Deere approved parts.

- Never attempt to repair a damaged or altered ROPS. It must be replaced to maintain the manufacturer's certification of the structure.
- Conforms to ISO21299:2009 for energy absorbing ROPS requirements.

MK71445.00001FD-19-10APR19

Keep Foot Platform Installed Properly

- Never operate the machine without the foot platform installed and properly latched.
- The foot platform is part of the ROPS safety zone.
- This machine is equipped with a removable foot platform for ease of maintenance; once maintenance is complete make sure the foot platform is installed and properly latched before operating the machine.
- Any alteration of the foot platform must be approved by the manufacturer.
- The protection provided by the ROPS will be impaired if the foot platform is subjected to structural damage, is involved in an overturn incident, or is in any way altered by welding, bending, drilling, or cutting.
- Never attempt to repair a damaged or altered foot platform. It must be replaced to maintain the manufacturer's certification of the structure.

MK71445.00001FE-19-10APR19

Keep Riders Off

- Only allow the operator on the machine. Keep riders off.
- Riders on the machine or attachment may be struck by foreign objects or thrown off the machine causing serious injury.
- Riders obstruct the operator's view resulting in the machine being operated in an unsafe manner.

OOU2005.000021B-19-05FEB13

Driving Safely on Public Roads

Avoid personal injury or death resulting from a collision with another vehicle on public roads:

- Use safety lights and devices. Slow moving machines when driven on public roads are hard to see, especially at night.
- Whenever driving on public roads, use flashing warning lights and turn signals according to local

Safety

regulations. Extra flashing warning lights may need to be installed.

OJQ2005.000021C-19-05FEB13

Checking Wheel Hardware

- A serious accident could occur causing serious injury if wheel hardware is not tight.
- Check wheel hardware tightness often during the first 50 hours of operation.
- Wheel hardware must be tightened to specified torque using the proper procedure anytime it is loosened.

MK71445.00001FF-19-10APR19

Wear Appropriate Clothing



TCT015572—UN—24MAY18

- Always wear safety goggles, or safety glasses with side shields when operating the machine.
- Wear close fitting clothing and safety equipment appropriate for the job.
- While mowing, always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.
- Wear a suitable protective device such as earplugs. Loud noise can cause impairment or loss of hearing.

TC00531.000021E-19-17MAY18

Maintenance and Storage



TCAL25963—UN—24MAY12

- Never operate machine in a closed area where dangerous carbon monoxide fumes can collect.
- Disengage drives, lower implement, lock parking brake, stop engine and remove key or disconnect spark plug (for gas engines). Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.

- Let engine cool before storing and do not store near flame.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park machine on level ground. Never allow untrained personnel to service machine. Understand service procedure before doing work.
- Use jack stands or lock service latches to support components when required. Securely support any machine elements that must be raised for service work.
- Before servicing machine or attachment, carefully release pressure from any components with stored energy, such as hydraulic components or springs.
- Release hydraulic pressure by lowering attachment or cutting units to the ground or to a mechanical stop and move hydraulic control levers back and forth.
- Disconnect battery or remove spark plug (for gas engines) before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking reels. Wear gloves, and use caution when servicing them.
- Keep hands, feet, clothing, jewelry and long hair away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Check brake operation frequently. Adjust and service as required.
- Be careful during adjustment of the machine to prevent entrapment of the fingers between moving blades and fixed parts of the machine.

OJQ2005.000021F-19-05FEB13

Avoid High Pressure Fluids



TCAL25960—UN—24MAY12

- Hydraulic hoses and lines can fail due to physical damage, kinks, age, and exposure. Check hoses and lines regularly. Replace damaged hoses and lines.
- Hydraulic fluid connections can loosen due to physical damage and vibration. Check connections regularly. Tighten loose connections.
- Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving

Safety

pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

- Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
- If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A. Information may be obtained in the United States and Canada only by calling 1-800-822-8262.

OUO2005.0000220-19-05FEB13

Prevent Fires

- Please review these recommendations with all operators. See your John Deere dealer with questions.
- Always follow all safety procedures posted on the machine and in this operator's manual. Before carrying out any inspection or cleaning, always shut off engine, set parking brake, and remove ignition key.
- Besides routine maintenance, one of the best ways to keep your John Deere equipment running efficiently and to reduce fire risk is to regularly remove debris buildup from the machine.
- After operating, allow machine to cool in an open area before cleaning or storing. Do not park machine near flammable materials, such as wood, cloth, or chemicals, or near an open flame or other sources of ignition, such as a water heater or furnace.
- Completely remove any combustible materials from equipment before storing by emptying any grass catcher bags, containers, and cargo boxes.
- Debris can accumulate anywhere on the machine, especially on horizontal surfaces. Remove grass and debris completely from engine compartment, muffler area, and from the mower deck or cutting units both before and after operating machine. Additional cleaning may be necessary when mowing or mulching in dry conditions.
- In addition to cleaning machine before using and storing, keeping engine area clean provides the greatest impact on fire prevention. Other areas requiring regular inspection and cleaning include behind wheel rims, wire harness, hose or line routing, mowing attachments, etc. Compressed air, leaf blowers, or water assists in keeping these areas clean.
- Frequency of these inspections and cleaning will vary depending on a number of factors, including operating conditions, machine configuration, operating speeds, and weather conditions

(particularly dry, hot, and windy conditions). When you are operating in these conditions, inspect and clean these areas frequently throughout the day.

- Excess lubrication or fuel/oil leaks or spills on the machine can also serve as collection sites for debris. Prompt machine repair and oil and fuel clean-up reduces the potential for debris collection.
- Bearing failures or overheating can result in a fire. To reduce this risk, always follow the instructions in the machine operator's manual regarding lubrication intervals and locations. Contact your local dealer if you have any questions about the lubrication intervals or location and if any unusual noises are coming from areas where bearings might be located. Washing the machine while warm may also reduce bearing life and increase potential for premature bearing failure.
- Always shut off fuel when storing or transporting machine, if the machine has a fuel shutoff.
- Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.

OUO2005.0000221-19-27MAR19

Tire Safety



TCAL25965—UN—24MAY12

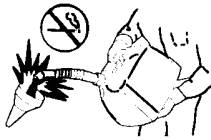
Explosive separation of a tire and rim parts can cause serious injury or death:

- Do not attempt to mount a tire without the proper equipment and experience to perform the job.
- Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.
- When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly.
- Check tires for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

OUO2005.0000222-19-10MAY17

Safety

Handling Fuel Safely



MXAL41938—UN—18FEB13

To avoid personal injury or property damage, use extreme care in handling fuel. Fuel is extremely flammable and fuel vapors are explosive:

- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container. Use only non-metal, portable fuel containers approved by the Underwriter's Laboratory (U.L.) or the American Society for Testing & Materials (ASTM). If using a funnel, make sure it is plastic and has no screen or filter.
- Never remove the fuel tank cap or add fuel with the engine running. Allow engine to cool before refueling.
- Never add fuel to or drain fuel from the machine indoors. Move machine outdoors and provide adequate ventilation.
- Clean up spilled fuel immediately. If fuel is spilled on clothing, change clothing immediately. If fuel is spilled near machine, do not attempt to start the engine but move the machine away from the area of spillage. Avoid creating any source of ignition until fuel vapors have dissipated.
- Never store the machine or fuel container where there is an open flame, spark, or pilot light such as on a water heater or other appliance.
- Prevent fire and explosion caused by static electric discharge. Static electric discharge can ignite fuel vapors in an ungrounded fuel container.
- Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before fueling.
- Remove fuel-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment with a portable container, rather than from a fuel dispenser nozzle.
- Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until the fueling is complete. Do not use a nozzle lock-open device.
- Never overfill fuel tank. Replace fuel tank cap and tighten securely.
- Replace all fuel container caps securely after use.

- For gasoline engines, do not use gas with methanol. Methanol is harmful to your health and to the environment.

OUO2005.0000223-19-12OCT16

Handling Waste Product and Chemicals

Waste products, such as, used oil, fuel, coolant, brake fluid, and batteries, can harm the environment and people:

- Do not use beverage containers for waste fluids - someone may drink from them.
- See your local Recycling Center or authorized dealer to learn how to recycle or get rid of waste products.
- A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. The seller of the chemical products used with your machine is responsible for providing the SDS for that product.

OUO2005.0000224-19-11OCT18