

SOUTH DAKOTA CCA STUDY GUIDE

The publications listed here are reference materials for the Performance Objectives for South Dakota Certified Crop Advisers. Publications are listed for each area under the four competency areas: Soil Nutrient Management, Soil and Water Management, Pest Management and Crop Protection. In many instances, individual publications cover more than one area, though they have been specifically identified for a given area objective.

This study guide is not intended to provide direct questions and answers for the CCA exams, but rather to provide reference materials for continuing education. In this electronic format reference materials may be easily updated to reflect the latest research based agronomic information for the benefit of the adviser and his/her clientele.

See also the national CCA study materials --

<https://www.certifiedcropadviser.org/exams/study-materials>

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SOIL NUTRIENT MANAGEMENT COMPETENCY AREAS

Area 1. Nutrient Movement in Soil and Water

How Soil Holds Water -- <http://www.ianr.unl.edu/pubs/fieldcrops/g964.htm>

Plant Growth Regulators: Their Use in Crop Production --
<http://muextension.missouri.edu/xplor/regpubs/ncr303.htm>

Area 2. Lime Application

Applying Fertilizer and Lime to CRP Land, Iowa State University, University Extension
CRP-5 Conservation Reserve Program Issues and Options --
<http://www.extension.iastate.edu/Publications/CRP5.pdf>

Ag Lime Impact On Yield in Several Tillage Systems, Iowa State University –
<http://www.ipm.iastate.edu/ipm/icm/1999/9-13-1999/aglimeimp.html>

Area 3. N, P, K, plant requirements

Best Management Practices for Nitrogen Use Statewide in Minnesota – University of
Minnesota, Cooperative Extension Service --
<http://www.extension.umn.edu/distribution/cropsystems/DC8560.pdf>

Understanding Nitrogen in Soils, University of Minnesota, Cooperative Extension
Service -- <http://www.extension.umn.edu/distribution/cropsystems/dc3770.html>

Effects of UAN or urea on growing corn, Iowa State University Cooperative Extension Service – <http://www.ipm.iastate.edu/ipm/icm/1996/5-27-1996/ureauan.html>

Nitrogen fertilizer management options, Iowa State Cooperative Extension Service – <http://www.ipm.iastate.edu/ipm/icm/2001/2-26-2001/noptions.html>

Nitrogen Fertilizers, Michigan State University Cooperative Extension Service – <http://www.canr.msu.edu/vanburen/e-896.htm>

Rate Variability of Anhydrous Ammonia Applicator Equipment, Iowa State University Cooperative Extension Service -- <http://www.extension.iastate.edu/Publications/PM1875.pdf>

Management of Urea Fertilizers, North Central Regional Publication #326 -- <http://muextension.missouri.edu/xplor/regpubs/ncr326.htm>

Fertilizer Urea, University of Minnesota Cooperative Extension Service, <http://www.extension.umn.edu/distribution/cropsystems/DC0636.html>

Why manage phosphorus, Iowa State University Cooperative Extension – <http://www.ipm.iastate.edu/ipm/icm/2000/4-24-2000/phosphorus.html>

Using Phosphorus Fertilizers Effectively, Misguide G82-601-A -- <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2346&context=extensionhist>

Phosphorus Facts Soil, Plant and Fertilizer, Kansas State University Cooperative Extension Service -- <http://terrapreta.bioenergylists.org/ksuphosphorusfacts>

Interpreting Mehlich-3 soil test results, Iowa State University Cooperative Extension Service -- <http://www.ipm.iastate.edu/ipm/icm/1999/2-15-1999/mehlich3.html>

Potassium deficiency symptoms in corn, Iowa State University Cooperative Extension Service – <http://www.ipm.iastate.edu/ipm/icm/2000/6-26-2000/kdef.html>

Area 4. Secondary nutrient and micronutrient plant requirements

Best Management Practices for Nitrogen Use Statewide in Minnesota – University of Minnesota, Cooperative Extension Service -- <http://www.extension.umn.edu/distribution/cropsystems/dc6129.html>

Use and Management of Micronutrient Fertilizers in Nebraska, NebGuide G82-596-A – <http://elkhorn.unl.edu/epublic/live/g1830/build/g1830.pdf>

Area 5. Nutrient Application

Soil Erosion: How it Effects Soil Quality -- <http://www.ipm.iastate.edu/ipm/icm/2002/8-19-2002/erosion.html>

Guidelines for Soil Sampling, NebGuide G91-1000-A -- <http://elkhorn.unl.edu/epublic/pages/publicationD.jsp?publicationId=831>

Interpretation of Soil Test Results, Iowa State University Cooperative Extension Service – <http://www.ipm.iastate.edu/ipm/icm/1999/1-18-1999/interpretpk.html>

Soil Sampling as a Basis for fertilizer Application, North Dakota State University Cooperative Extension Service – <http://www.ext.nodak.edu/extpubs/plantsci/soilfert/sf-990.htm>

Area 6. Plant nutrient sources and application

Soil Sampling as a Basis for fertilizer Application, North Dakota State University Cooperative Extension Service – <http://www.ext.nodak.edu/extpubs/plantsci/soilfert/sf-990.htm>

Biological Inoculants and Activators: their value to agriculture, Michigan State University Cooperative Extension Service – North Central Regional Publication 168.

Effectiveness of using low rates of plant nutrients -- <http://www.ext.nodak.edu/extpubs/plantsci/soilfert/ncr341w.htm>

Equipment considerations: liquid fertilizer, Iowa State University Cooperative Extension Service – <http://www.ipm.iastate.edu/ipm/icm/2001/4-16-2001/liqfert.html>

Manure Management, University of Minnesota Cooperative Extension Service – http://www.extension.umn.edu/distribution/cropsystems/components/7401_01.html

Management Practices: How to Sample Manure for Nutrient Analysis, Iowa State University Cooperative Extension Service -- <http://www.extension.iastate.edu/publications/pm1558.pdf>

Area 7. State laws and rules governing fertilizer and manure use in storage and handling

South Dakota Laws regarding fertilizer and manure application -- <http://www.state.sd.us/doa/das/hp-fert.htm>

SOIL AND WATER MANAGEMENT COMPETENCY AREAS

Area 1. Soil drainage and water movement in soils

Soil cation ratios for crop production -- <http://www.extension.umn.edu/distribution/cropsystems/DC6437.html>

Soil electrical conductivity mapping – [http://www.ipni.net/ppiweb/ppibase.nsf/b369c6dbe705dd13852568e3000de93d/c9adc4debd1cf45c852569d700636eda/\\$FILE/SSMG-30.pdf](http://www.ipni.net/ppiweb/ppibase.nsf/b369c6dbe705dd13852568e3000de93d/c9adc4debd1cf45c852569d700636eda/$FILE/SSMG-30.pdf)

Planning farmland drainage systems – <http://www.bbe.umn.edu/extens/ennotes/enspr97/plan.html>

Soil, water and plant characteristics important to irrigation – <http://www.ext.nodak.edu/extpubs/ageng/irrigate/eb66w.htm>

Area 2. Soil conservation

Buffers, common-sense conservation – <http://www.nrcs.usda.gov/feature/buffers/BufrsPub.html>

Using conservation tillage to control erosion – <http://www.extension.umn.edu/distribution/cropsystems/components/7694c02.html>

Preventing soil erosion after spring rains -- <http://www.ipm.iastate.edu/ipm/icm/2001/5-21-2001/preventeros.html>

Estimating percent residue cover using the line-transect methods – <http://elkhorn.unl.edu/eublic/live/g1931/build/g1931.pdf>

Wet soils vulnerable to compaction – <http://www.ipm.iastate.edu/ipm/icm/2001/6-11-2001/wetsoil.html>

Area 3. Tillage operations and soil characteristics

Soil, water and plant characteristics important to irrigation – <http://www.ext.nodak.edu/extpubs/ageng/irrigate/eb66w.htm>

Wet soils vulnerable to compaction – <http://www.ipm.iastate.edu/ipm/icm/2001/6-11-2001/wetsoil.html>

Area 4. Management of saline and sodic soils (SD)

Soil cation ratios for crop production -- <http://www.extension.umn.edu/distribution/cropsystems/DC6437.html>

Soil, water and plant characteristics important to irrigation – <http://www.ext.nodak.edu/extpubs/ageng/irrigate/eb66w.htm>

Managing saline soils in North Dakota -- <http://ndsuent.nodak.edu/extpubs/plantsci/soilfert/sf1087-1.htm>

Area 5. Irrigation (SD)

Planning to irrigate – <http://www.ext.nodak.edu/extpubs/ageng/irrigate/ae92w.htm>

Area 6. Water Quality

Water quality and nitrogen -- <http://elkhorn.unl.edu/e-public/live/g1931/build/g1931.pdf>

Managing nitrogen to prevent groundwater contamination -- <http://www.ag.ndsu.edu/pubs/plantsci/soilfert/eb64w.htm>

Potential priority watersheds for protection of water quality from contamination by manure nutrients – http://www.nrcs.usda.gov/technical/NRI/pubs/wshedpap_w.html

Nitrogen application with irrigation water – Chemigation -- <http://www.extension.umn.edu/distribution/cropsystems/DC6118.html>

Sources of groundwater contamination -- <http://dnr.wi.gov/org/water/dwg/gw/>

PEST MANAGEMENT COMPETENCY AREAS

Area 1. Basic pest management practices

Herbicide Mode of Action -- <http://www.extension.purdue.edu/extmedia/WS/WS-23-W.html>

Integrated Pest Management (IPM) BMP's for Groundwater Protection from Pesticides – <http://www.ext.nodak.edu/extpubs/h2oqual/watgrnd/ae1114w.htm>

Area 2. Management of weeds

2010 Herbicide guide for corn and soybeans in Iowa -- <http://www.weeds.iastate.edu/mgmt/2010/WC94%202010.pdf>

Weed web page SDSU Extension -- <http://www.sdstate.edu/sdces/resources/crops/weeds/>

Weed Seedling Identification -- <http://www.agron.iastate.edu/~Weeds/ag317/ID/seedlingID.html>

Area 3. Management of infectious plant diseases

SDSU Plant Pathology web page – <http://www.sdstate.edu/ps/extension/plant-path/index.cfm>

Crop Rotations for Managing Plant Disease – <http://www.ag.ndsu.edu/pubs/plantsci/crops/eb48-1.htm>

Symptoms and Controls of Crop Diseases – <http://www.ext.nodak.edu/extpubs/plantsci/crops/pp533w.htm>

Ergot -- <http://www.ext.nodak.edu/extpubs/plantsci/crops/pp551w.htm>

White mold life cycle -- http://www.soybeans.umn.edu/crop/diseases/whitemold/white_mold_life.htm

Area 4. Management of insects

SDSU Extension Entomology web page --

<http://www.sdstate.edu/ps/extension/entomology/index.cfm>

2010 Field Crop Insect Management Recommendations –

<http://www.ag.ndsu.edu/pubs/plantsci/pests/e1143w1.htm>

Gypsy Moth – <http://www.fs.fed.us/ne/morgantown/4557/gmoth/>

Sunflower Insect Pest Management – <http://ipmworld.umn.edu/chapters/charlet2.htm>

The Armyworm and the Army Cutworm --

<http://www.ext.nodak.edu/extpubs/plantsci/pests/e830w.htm>

Wireworm Management for North Dakota Field Crops --

<http://www.ext.nodak.edu/extpubs/plantsci/pests/e188-1.htm>

Corn cutworms -- <http://www.ianrpubs.unl.edu/sendIt/g1153.pdf>

Bt corn and the European Corn Borer --

<http://www.extension.umn.edu/distribution/cropsystems/DC7055.html>

European Corn Borer -- [http://www.ipm.iastate.edu/ipm/icm/1996/8-5-](http://www.ipm.iastate.edu/ipm/icm/1996/8-5-1996/ecbinaug.html)

[1996/ecbinaug.html](http://www.ipm.iastate.edu/ipm/icm/1996/8-5-1996/ecbinaug.html)

Stored grain pest management (part of IPM page) --

<http://www.msue.msu.edu/msue/imp/modc2/07189605.html>

Area 5. Calibration of pesticide application equipment

SDSU Extension Pesticide Education web page --

<http://www.sdstate.edu/ps/extension/pat/index>.

Area 6. Using pesticide in an environmentally sound way

SDSU Extension Pesticide Education web page --

<http://www.sdstate.edu/ps/extension/pat/index>

Applying Pesticides Correctly -- <http://www.ext.vt.edu/pubs/envirohort/426-710/426-710.html>

Spray Equipment and Calibration –
<http://www.ext.nodak.edu/extpubs/ageng/machine/ae73-2.htm>

Spray Equipment and Calibration --
<http://www.ext.nodak.edu/extpubs/ageng/machine/ae73-3.htm>

Sprayer Calibration Fundamentals --
<http://www.ext.colostate.edu/PUBS/FARMMGT/05003.html>

How is the Assessment Process for Groundwater Contamination from Pesticides Used for BMP Selection – <http://www.ext.nodak.edu/extpubs/h2oqual/watgrnd/ae1114w.htm>

Area 7. Integrated pest management

SDSU Extension IPM web page -- <http://www.sdstate.edu/ps/extension/ipm/index>.

Integrated Pest Management (IPM) BMP's for Groundwater Protection from Pesticides –
<http://www.ext.nodak.edu/extpubs/h2oqual/watgrnd/ae1114w.htm>

Farmstead BMP Recommendations for Groundwater Protection from Pesticides –
<http://www.ext.nodak.edu/extpubs/h2oqual/watgrnd/ae1114w.htm>

CROP PROTECTION COMPETENCY AREAS

Area 1. General crop adaptation

SDSU Crop testing -- <http://www.sdstate.edu/ps/extension/crop-mgmt/variety-trials-results.cfm>

Complete crop production index --
<http://www.ipm.iastate.edu/ipm/icm/indices/cropproduction.html>

Area 2. Tillage systems used for seedbed preparation of row crops, small grain and forage crops

Fall Tillage and tillage equipment – <http://www.ipm.iastate.edu/ipm/icm/2001/8-20-2001/falltillage.html>

Tillage in 2001: Fall strip-tillage – <http://www.ipm.iastate.edu/ipm/icm/2000/8-21-2000/striptillage.html>

Conservation tillage and planting systems --
<http://www.ianrpubs.unl.edu/sendIt/g1516.pdf>

Ridge plant systems: equipment -- <http://www.ianrpubs.unl.edu/sendIt/g1762.pdf>

Ridge tillage for corn and soybean production: environmental quality impacts --
<http://www.nal.usda.gov/afsic/pubs/contillage.shtml>

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Area 3. Seeding date factors

Complete crop production index --
<http://www.ipm.iastate.edu/ipm/icm/indices/cropproduction.html>

SDSU Extension Crop Management -- <http://www.sdstate.edu/ps/extension/crop-mgmt/index.cfm>

Corn production -- <http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/a1130-8.htm>

Area 4. Seeding rates and pattern factors of major crops

Complete crop production index --
<http://www.ipm.iastate.edu/ipm/icm/indices/cropproduction.html>

Plant populations for maximum corn yield potential –
http://www.pioneer.com/CANADA/pro_services/mmax/corn_plant_populations_yield.htm

New opportunities in variable-rate seeding corn –
https://www.pioneer.com/growingpoint/agronomy/crop_insight/variable_rate.jsp

Corn production -- <http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/a1130-8.htm>

Crop rotations for increased productivity –
<http://www.ext.nodak.edu/extpubs/plantsci/crops/eb48-1.htm>

Area 5. Seeding depth factors

Complete crop production index --
<http://www.ipm.iastate.edu/ipm/icm/indices/cropproduction.html>

Corn production -- <http://www.ag.ndsu.edu/pubs/plantsci/rowcrops/a1130-2.htm>

Area 6. Crop damage, mortality and factors influencing replanting decisions

Replanting after early season crop damage --

<http://www.ag.ndsu.edu/pubs/plantsci/crops/a934.html>

Small grain damage from frost dependent on many factors --

<http://www.ext.nodak.edu/extnews/newsrelease/1998/060498/02smallg.htm>

Hail damage assessment to soybeans --

http://extension.iastate.edu/carroll/crops/hail_soybean.htm

Complete crop production index --

<http://www.ipm.iastate.edu/ipm/icm/indices/cropproduction.html>

Determining the yield potential of remaining plants --

<http://www.extension.umn.edu/distribution/cropsystems/components/5701b1.html>

Management information for replant decisions corn and soybeans --

<http://www.extension.umn.edu/distribution/cropsystems/DC5701.html>

Uneven corn fields --

<http://www.agry.purdue.edu/ext/corn/news/articles.99/990613a.html>

Herbicide injury of Corn and Soybeans --

<http://www.btny.purdue.edu/Extension/Weeds/HerbInj/InjuryMOA1.html>

Area 7. Cropping systems

The Corn and Soybean Rotation Effect -- <http://corn.agronomy.wisc.edu/AA/A014.aspx>

Crop rotations for increased productivity --

<http://www.ext.nodak.edu/extpubs/plantsci/crops/eb48-1.htm>

Area 8. Identification of crops in both seed and vegetative states

How a soybean plant develops --

http://extension.agron.iastate.edu/soybean/production_growthstages.html

Corn production -- <http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/a1130-8.htm>

Area 9. Growth and development stages of major crops (SD)

How a soybean plant develops -- <http://www.agron.iastate.edu/soybean/beangrows.html>

Corn production -- <http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/a1130-8.htm>

How a corn plant develops -- <http://maize.agron.iastate.edu/corngrows.html>

Identifying leaf stages in small grains --
<http://www.ext.nodak.edu/extpubs/plantsci/weeds/w564w.htm>

Grain crops production and management --
<http://corn.agronomy.wisc.edu/FISC/Wheat/Development/Development.htm>

Area 10. Crop improvement and biotechnology

SDSU Extension Crop Management -- <http://www.sdstate.edu/ps/extension/crop-mgmt/index.cfm>

Application of biotechnology to crops: benefits and risks -- http://www.cast-science.org/websiteUploads/publicationPDFs/biotc_ip.pdf

Iowa State University – Biotechnology site – <http://www.biotech.iastate.edu/>

Area 11. Precision Ag

Defining management zones for precision farming –
https://www.pioneer.com/growingpoint/agronomy/crop_insight/management_zones.jsp

Yield monitors create on-and off-farm profit opportunities –
https://www.pioneer.com/growingpoint/agronomy/crop_insight/yield_monitors.jsp

Site-specific farming: what is it? --
<http://www.ext.nodak.edu/extpubs/plantsci/soilfert/sf1176-1.htm>