SDSU Extension

iGrow Soybean

BEST MANAGEMENT PRACTICES

Chapter 2:
Using Field Records for Current Recommendations

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Optimizing soybean profitability requires an investment in time that leads to a clear understanding of the factors limiting production. This process starts by understanding what happened last year, followed by making changes to address those deficiencies. Knowledge-based management strategies can minimize risk and maximize efficient production by linking soil condition, fertility management, pest management, tillage, and residue management into your system. This chapter discusses what should be included in your field records and how to integrate this information into your management program.

Figure 2.1. Increasingly we are integrating precision management into IPM management.
(Photo courtesy of SDSU)

Field records

Field records are the gathering of what was done and what happened in a specific field into a single folder (Figs. 2.1 and 2.2). Recordkeeping becomes the primary source of information. Whether you keep notes written in a notebook or use computerized software, field information can be your greatest management tool. Miscalculated or incorrect applications of crop inputs can lead to expensive mistakes. Field records could prevent mistakes, or indicate why a problem occurred (Deneke et al., 2012; Chapter 29).

Figure 2.2. To help scout fields we can collect GPS information to identify management zones. (Photo courtesy of SDSU)

Electronic recordkeeping is swiftly becoming the norm in modern agriculture. Yields are measured and located in the field via yield monitors and global positioning systems (GPS). Fertilizer and pesticide applications are mapped using similar technologies. Scouting records are invaluable for determining pest problems. Field records can be used for determining land value and planning a management strategy once land is acquired.

Table 2.1. List of recommended items to include for field records.

1. Prior field history:
    a. crop yields and field productivity,
    b. location of old farmsteads,
    c. tillage practices,
    d. fertilizer applications and locations of fertilizer bands,
    e. pest maps from the field,
    f. varieties, pesticide, and fertilizers applied for the prior three years,
    g. prior weather conditions,
    h. soil test results (Chapters 25 and 26),
    i. seed emergence (Chapter 9), *and*
    j. summary of previous pests and yield-limiting factors.
2. Soybean variety and trait package.
3. Soybean seed treatments.
4. Seeding date, rate, row spacing, and tillage.
5. Rate and date of fertilizers and pesticides applications.
6. Specific crop scouting:
    a. GPS location,
    b. extent and magnitude of problem,
    c. beneficial insects present, and
    d. date of scouting.
7. Pest information in adjacent fields.

Field productivity

Field productivity is impacted by long-term management of the capabilities and limitations of the soils. There are a few simple techniques to evaluate the soils production potentials.

Using a soil survey can be a good first approach. Information attained from the survey can be used to assess your relative yield potential.

The land capability class provides a rating for crop production and the subclass provides the main limitation for crop production. Drainage class, productivity index value, soluble salts, exchangeable sodium percentage, and other properties can identify limitations and opportunities.

Although the soil survey does not provide detailed data, it can be useful for gaining general knowledge of the site. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

A second approach is to determine how prior management impacted long-term productivity. If long-term productivity information is not available, it may be possible to assess yield improvements using archived landsat images. Currently this information is archived at the EROS Data Center located near Sioux Falls.

Archived data can be used as liberal benchmarks. If the data suggests that yields have not increased, then the land may not have been managed properly or natural processes have impacted production. Diagnosing problems may be difficult and solutions may require capital investments or long-term investment recovery. This step involves organizing your field records.

Yield data

Yield data is a valuable tool for evaluating management strategies. Differences between the observed and expected yields can be used to identify problem areas.

Fields can be divided into at least four categories (Fig. 2.3):

- Low Yield-Low Variability
- Low Yield-High Variability
- High Yield-High Variability
- High Yield-Low Variability

Techniques for identifying these zones are available in Pierce and Clay (2007). Ideally, you want a field that produces a high yield year after year. Reviewing historical management and yield data can help explain why these areas vary in yield from year to year and if a remedy is suitable (Fig. 2.4).

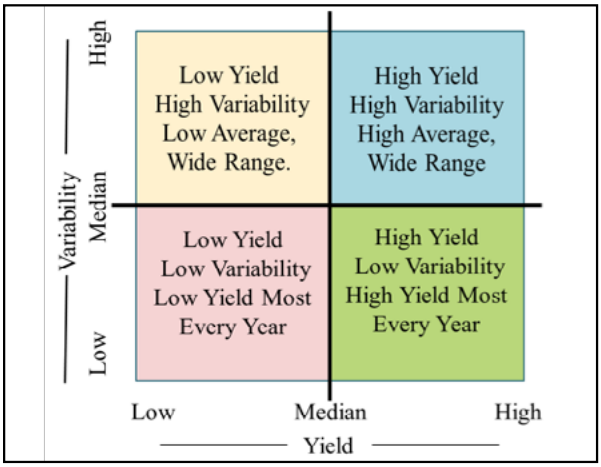

Figure 2.3. Field divisions by yield category. (Reitsma et al., 2012)

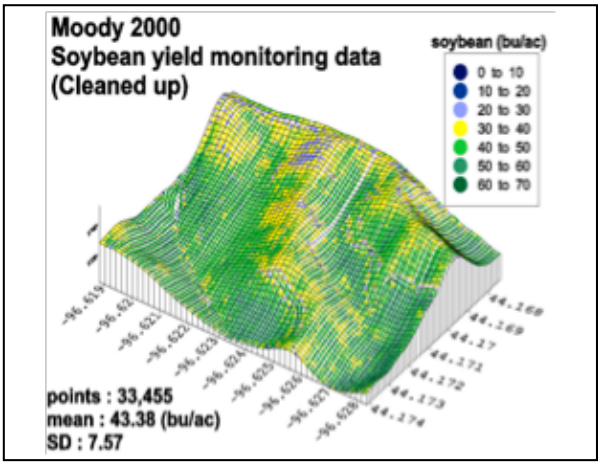

Figure 2.4. A sample yield map. (Courtesy of SDSU)

Farmsteads

A history of land use also provides valuable information. When South Dakota was homesteaded, most quarter sections had a farmstead where livestock were maintained. Even though many of these homesteads were removed 50 years ago, their location can be easily located, based on grid soil sampling (Fig. 2.5). These hotspots may be small or large depending on the homestead. A technique for managing this variability is available in Chapter 20. These areas can be identified in old aerial photographs available at local USDA-NRCS offices.

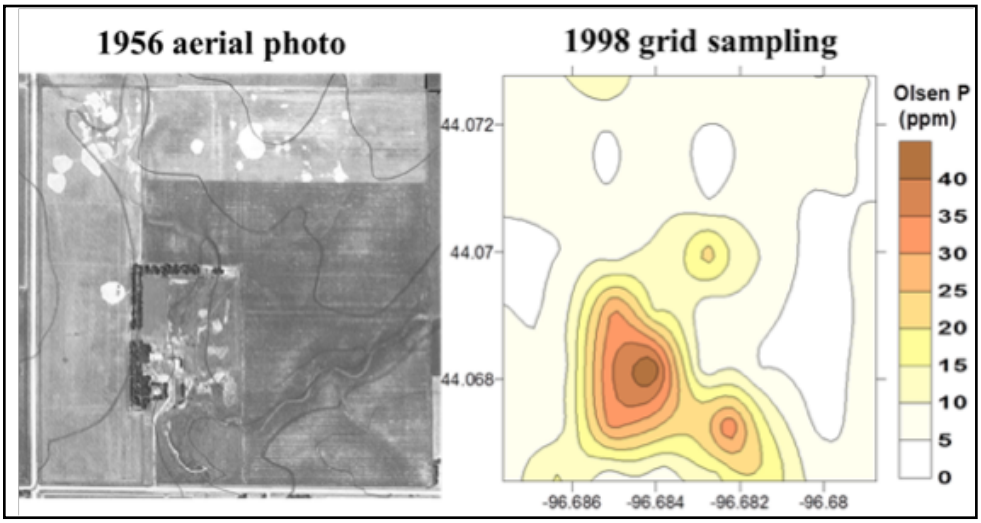

Figure 2.5. Influence of farmstead and feedlot on soil test P levels. (Reitsma et al., 2012)

Pest management history

Field records and record keeping are critical components of an integrated pest management program (IPM). Field pressure from weeds, plant diseases, soybean cyst nematodes (SCN) and insects is affected by crop management practices (Fig. 2.6). Access to this information is critical in selecting the appropriate cultivar.

Figure 2.6. Soybean field weed pressure.
(Photo courtesy of Larry Wagner, SDSU)

Weeds

A history of tillage methods may have contributed to the weed species dominating a field. Weed control management history provides a picture of what weeds may have existed in the field. Documents of herbicide applications may also indicate possible carryover problems. Past records of weed control success may reveal the weed seed bank that exists in the soil.

The value of knowing past weed pressures and the methods used to effectively manage them is key in evaluating the field and planning future best management practices. Weed records can also be used to identify herbicide resistance (Chapter 33).

Soybean diseases and nematodes

Fields that have a history of a soil-borne disease very rarely are free from a reoccurrence of the pathogen. When weather conditions promote the growth of the disease spores, there will be an infection in the field. It might occur after being absent for a number of years. Soil-borne soybean diseases that are common to the upper Midwest are root rot, white mold, and seedling blight. Although not as common, sudden death syndrome is also suspect. (Ruden et al. 2011; Chapters 57-60)

Preventative management of susceptible fields by planting resistant varieties and delayed planting dates could avoid considerable yield loss. Disease history records should be included in a field profile (Hall et al., 2011).

Figure 2.7. Effect of SCN on soybeans.
(Photo courtesy of Larry Wagner, SDSU)

Soybean cyst nematode (SCN) can reduce yields (Smolik et al., 2007; Chapter 57). If a field previously had SCN, it is likely that it still has SCN. If you suspect that a field has SCN, it should be confirmed by soil sampling (Fig. 2.7).

Insects

A complete history of each field should include any insect infestations, which management methods worked, and which did not. It is very important to find records that contain information including: crop rotation, tillage, planting dates, insect identifications, insect scouting reports, and economic losses. All of these factors could be useful in predicting future insect infestations. When assessing insects, scout the borders of your field (Chapter 29). Many insects over-winter in these plants (Chapters 35, 36, and 37).

Conclusion

Access to detailed field records can provide very useful and valuable information. Field records can paint a picture of a field as it exists, and what its capabilities can be in the future. The use of yield monitors and maps will enable producers to build a profile for every field. The gathering of field information and data from the past, present, and future is the basis of productivity and economic efficiency.

This chapter has touched on some of the primary principles of evaluating fields on their past management. Accurate, concise field records and data will provide the knowledge to creatively minimize risks and maximize profits.

References and additional information

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