

## Applications of Global Positioning System (GPS) in Agriculture

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### SUMMARY

The accuracy of GPS allows farmers to create farm maps with precise acreage for field areas, road locations and distances between points of interest. GPS allows farmers to accurately navigate to specific locations in the field, year after year, to collect soil samples or monitor crop conditions.

### INTRODUCTION

GPS stands for Global Positioning System. This technology has advanced impressively in the recent past and has various applications across a number of industries. One main area where GPS has found importance is in the field of precision farming and agriculture. We take a look at some of the most important uses of GPS in agriculture and how this has changed the way farmers do business. The accuracy of GPS allows farmers to create farm maps with precise acreage for field areas, road locations and distances between points of interest. GPS allows farmers to accurately navigate to specific locations in the field, year after year, to collect soil samples or monitor crop conditions.

### Uses of GPS in Agriculture

**Soil sampling:** GPS provides the necessary data to accurately determine soil variability and to establish whether a given type of soil is ideal for the growth of a particular crop. Soil sampling also helps in profiling of soils to distinguish between soils that are viable and those that are not.

**Weed location:** Using linear sampling techniques, GPS can be used to single out weed patches in vast areas of lands. Weed usually hinders the effective growth of a crop and hampers the eventual yields over a given period of time.

**Accurate planting:** GPS also comes in handy when planning the planting of a given crop. Each seed has specific spacing and depth required depending on the soil type. Using GPS, it is easier to tell what spacing a given seed requires and to what depth the seed should be planted in order to return maximum yields.

**Determination of planting ratios:** GPS can also be used in the determination of planting ratios of seeds. Some seeds have specific spaces in between them while others may be planted together with other seeds. GPS helps in determining the ratio of this type of planting.

**Creation of yield maps:** GPS plays an important role in the creation of yield maps for specific types of crops. For instance, during harvests, GPS can be used to map out expected yields of a given crop from one piece of land based on the land characteristics and the seed characteristics.

**Harvesting:** GPS plays an important role in the determination of what area of a farm is ready to be harvested and how the harvesting will take place. The GPS will also give an estimate of the size of the area being harvested and the expected returns from the area.

**Locating a yield map:** GPS can also be used to locate a yield map by mounting a GPS receiver on farm machinery and then collecting the data.

**Environmental control:** Applying herbicides or pesticides based on the capacity of each square meter reduces the application amount of the pesticide being used. This allows the soil to absorb all the pesticide hence reducing the chances of runoff.

**Farm planning:** GPS plays an important role in the planning of a farmland ready for planting. GPS will give the overall size of the area and help in determining what crop will be planted on what part of the farmland using various factors such as soil characteristics and crop characteristics.

**Field mapping:** GPS gives an exact estimate of the field that is being prepared for farming. Through this, experts can tell what part of the field will be used for farming activities and what area will be used for other non-farming related activities.

**Soil sampling:** Soil sampling is one of the most important uses of GPS in agriculture. It is important to know what type of soil is available on a given farmland as this will help in determining the type of crop to be planted on that farm.

**Crop scouting:** GPS gives an exact mapping of an area helping when scouting for crops that are grown in a particular area. Through this, experts are able to tell the nature and type of crops that thrive within a given locality and help in improving the quality of that crop.

**Yield mapping:** After a crop has been planted and is ready for harvesting, GPS can be used to make an estimation of the yield of a given farmland. This can be achieved through aerial mapping where experts can tell the quantity of a yield based on the area covered by the crop.

**Correlation of production techniques with crop yields:** GPS can be used to make a correlation of the production technique that was used over a given piece of land and the crop yields after a given period of time. This information can then be used to determine the viability of a given technique.

**Soil property mapping:** GPS plays an important role in determining the soil property of a given soil to establish its variability and suitability for a given crop. It also helps researchers identify which area of a farmland contains what type of soil and what area is suitable for a given crop.

**Machinery location:** It is easier to locate any farm machinery on a vast piece of land thanks to GPS. The farmer does not need to physically go out and locate farm equipment especially in cases where the number is high. GPS can pinpoint the exact location of these farm machineries.

**Machinery direction:** Technology has necessitated the use of autonomous farm machinery for use in farming. GPS is used to direct these machineries into deciding what direction the seeds will be placed and the spaces in between each seed.

**Identification of areas suitable for cultivation:** GPS plays an important role in deciding what areas in a given farmland are suitable for cultivation. This is done through aerial mapping of the area under cultivation and the analysis of the soil samples to determine the viability of the soil.

**Classification of areas for cultivation based on various characteristics:** GPS can be used to classify different areas for cultivation based on various characteristics such as soil types and the terrain maps. Areas that are not suitable for cultivation can be identified and alienated while those that are suitable can then be developed.

**Assessment for the availability of water in an area:** GPS has been used in the assessment of the availability of water or water sources within a given locality. Water sources such as rivers or canals can easily be singled out using GPS.

**Identification of irrigated crops:** GPS can also be used to identify areas where there are crops that have been irrigated and those that have not been irrigated. This helps in creating a profile between irrigated crops and non-irrigated crops to help in making comparisons.

**Identification of swamps and other water logged areas:** GPS can be used to identify swampy areas and waterlogged areas that may not be ideal for certain types of crops. This helps in determining the suitability of these types of lands for certain crops and their non-suitability for other types of crops.

**Rivers mapping:** GPS helps in creating a map of all rivers within a locality which builds a profile of the area with regards to the water flow. Farmers and researchers can be able to tell the presence of rivers and help in determining the crops that will be grown in that locality.

**Land usage in the locality:** GPS can also be used to monitor the land usage within a given locality. Through GPS, it is easier to tell what area of the land has been put under cultivation and what part of the land has been left bare.

**Contour mapping:** In cases where the land is irregular, GPS has been instrumental in determining the contours within the specific locality. This is because some crops may not do well in contoured lands while others may thrive in these lands.

**Irrigation systems mapping such as dams or canals:** In cases where the land needs to be irrigated, GPS can help locate some irrigations systems such as dams and canals. This will make it easy as it will avail the necessary water needed for irrigating the lands.

**Meteorological mapping such as climatic patterns:** GPS plays an important role in mapping out some climatic conditions which may determine the type of crop that can grow in a given region.

**Personnel mapping:** GPS may also play an important role in mapping out the number of personnel in a given farmland at specific times of the day. This is important if a farmer wants to measure the productivity of the personnel in a farm.

**Plantation mapping:** GPS can help in creating a map of a plantation and establishing the crop yields in a given plantation.

**Water bodies mapping:** GPS can also be used to map out the existing water bodies within a given area to assess the viability of crop growth and crop yields in a given area.

## CONCLUSION

From above information it is concluded that GPS technology as an integral part of precision agriculture. GPS plays a critical role in optimization the profits, sustainability with a reduced environmental impact. Farmers and agriculture service providers can expect even further improvements as GPS continues to modernize. The use of GPS in Agriculture is limited but it is fair to expect wide spread use of GPS in future.

## REFERENCES

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