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Annotated Bibliography

Precision Agriculture: Shaping the future of Farming

Precision agriculture is the practice of incorporating technology into farming to yield better crops. Also known as precision ag or precision farming, it consists of many crucial components such as drones, sensors, control systems, etc. This document is amalgamated using 5 different sources which presents various aspects of precision farming. The first source describes the history of precision ag and key barriers for its adoption. The second resource talks about the tips which new investor companies can consider, before investing into the precision ag industry. Whereas, the third resource compare the benefits of precision ag over traditional farming methods. It also talks about how seeds and plants can be modified for better crop yield. The fourth source is very interesting as it mentions how precision ag can prevent crop destruction caused due to moulds. It also compares the imagery and information obtained from drones compared to satellites. The last and fifth resource provides detail of companies which are working and have invested in precision farming technology. All these resources are connected via precision farming but are very different from each other. Due to this, the information provided through these resources is very wide, research based and crucial for the understanding of advancements in agriculture. With the help of these resources, readers can get an idea of the tech revolution taking place in the agriculture sector and what will be its future.

“Agriculture’s Improving Image.” *Mega*, Scientific American, 7 May 2018, https://www.scientificamerican.com/custom-media/pictet/agricultures-improving-image/#

This resource is exhibited by Carl Salvaggio, who is a professor in digital imaging and remote sensing at the Rochester Institute of Technology. He discusses about the smart farming methods and how technology is developing for agriculture. The website displays a few interesting and current issues about farming, which are being worked on using technology such as drones and digital imagery. The author talks about how mould destroys more than USD 1B worth of crop every year and how technology can save that in the future. His work glimpses through the rules allowed to fly drones over crop fields and how research is being conducted on that basis to collect better data. Another great information presented in the resource is the comparison between satellite and drone for collection of field details for farming. It says that drones are more efficient for precision farming than satellites, but they cost farmers more as well. It is a resourceful website covering a wide range of aspects of precision farming and providing us with good facts.

“AI, Robotics, And The Future Of Precision Agriculture.” *CBInsights Research Briefs*, CB Insights, 7 July 2017, https://www.cbinsights.com/research/ai-robotics-agriculture-tech-startups-future/

This website represents a magnificent research performed on companies investing in Artificial Intelligence and Robotics in Agriculture. The writer provides a detailed list of companies, investors and their total funding towards the tech development in Agriculture. This delivers a broad exposure of work-in-progress and companies who are leading those projects. The author begins with talking about investments done in last 5 years and what companies are working at. Later in the text, their work is divided into 5 categories based on the area of focus. The categories are: *Analyzing satellite imagery* which provides macro-level knowledge of agricultural practices; *In-field monitoring* which uses drones and computer vision for monitoring crops in real time; *Assess crop and soil heat* which uses machine learning to predict effects of various microbes on crops; *Agricultural robots* that includes ground robots to perform various agricultural tasks; *Predictive analytics* that uses machine learning models for agriculture R&D. The resource explains these categories in detail and talks about companies directly working with these focuses. It shows that where does precision farming stand in this wide range of agricultural development, which is closest to in-field monitoring.

Ling, Geoffrey. “Precision Farming Increases Crop Yields.” *Scientific American: Engineering*, Scientific American, 26 June 2017, https://www.scientificamerican.com/article/precision-farming/

Author Geoffrey Ling has created this intriguing document which revolves around the comparison between the old and new ways of agriculture. Traditional farming methods work equally on every part of the field. For example, water and pesticides are given all throughout the field rather than spraying only to the places where it is required. On the other hand, precision farming methods keep close track of the entire field. It provides information about what area needs more water and pesticides or less. This latest approach towards agriculture results in better crop yields, avoiding unwanted wastage of important farming resources. Author also talks about how organizations are investing in precision farming; universities and colleges are researching and teaching about it. Precision farming is a big part of the future of agriculture sector. The website also mentions about how all the information collected via precision agriculture can be used for research purposes. Many seed producers and scientists are working together to find methods by which quality of plants can be improved. Researchers are studying about the most favourable conditions to grow certain plants using real-time farm data. In conclusion, this resource is useful to understand the differences between the traditional and new methods of farming.

Manning, Lauren. “Cracking the Code on Precision Farming and Digital Agtech Adoption.” *Agfundernews.com*, AgFunder News, 23 May 2017, https://agfundernews.com/cracking-code-precision-farming-digital-agriculture.html

The author begins her discussion very interestingly with the history of agricultural innovation. This represents the bigger picture of when precision agriculture started and how it evolved. The resource outlines the adoption of technology in the agriculture sector and certain barriers which hinders its adoption. The author has put together some important factors due to which farmers resist the use of latest software and technology to yield better crops. She brings up crucial points such as lack of appropriate technological infrastructure which is required in order to interact with the software. Not all farmers are financially capable or willing to risk such a big investment, to completely switch over to a new way of farming. In the big world of internet where everyone is worried about data safety, agriculture is not behind. It is well debated whether the generated data is kept safe with the owners or not. Few other gripping elements about hurdles of agricultural technology adoption are unavailability of universally accepted software platforms. Farmers will appreciate an easy-to-operate machine rather than something complicated. The author concludes her work by expressing that even after these problems, agriculture sector is transforming and adapting new ways for better food production. It is a useful resource showing that the technology used for precision farming needs more development before becoming a standard in the future of agriculture.

Nolet, Sarah. “What Agtech Can Learn from Precision Ag Veterans.” *Agfundernews.com*, AgFunder News, 28 August 2017, https://agfundernews.com/agtech-can-learn-precision-ag-veterans.html

The author Sarah Nolet has put together some great tips for the beginners entering the field of precision agriculture. The article begins with an introduction to Society of Precision Agriculture Australia (SPAA). It is an organization where many farmers, agronomists and researchers work together to reduce the gap between conducted agricultural research and new technology to be applied in the field. This webpage is a unique resource as it discusses the measures for the companies investing into agricultural technology rather than the farmers. It covers a lot of vital points to be considered before jumping into precision agriculture such as importance of a farmer’s voice. Farmers are a crucial part of this changing technology as they can inspire other farmers. Hence, if they talk about the benefits of technology, it is considered as a great asset. Many farmers find it difficult to recognize the first step towards precision ag which results in less farmers investing into the technology. The website later talks about how to initiate beginner steps towards agricultural tech adoption and how farmers faces challenges to make this shift. It also puts light on how flashy tech can be used to engage future generation. Then author concludes by talking about SPAA and the companies involved with the organization to learn more about technology used for farming.