Precise farming through end-to-end technologies

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Abstract. New times require new approaches to be implemented in different sectors, as old methods are irrelevant. New challenges such as overpopulation and its branches of events that are negatively affecting our planet and likewise humans and other living things. Therefore, new ideas are born and implemented. Precise farming is a promising approach that will tackle not just environmental issues, but also other minor issues in agricultural sectors that will be covered in this work. This work will outline the idea behind precise farming and its state in the present. Also, the positive and negative side of the approach will be discussed. In the end, Future perspective of the Precise farming will be outlined.

1 Introduction

We as a human live in the time of uncertainties. Different challenges put our future to the side, where a bright future seems unreachable. There are many events that introduces issues, which can be solved through combination of ideas, approaches and technologies. However, one of the main challenges that gives the path for other to emerge is overpopulation. In thousands of years, people have not reached even close to the number that we have today. Due to the progress within different fields and area, population rise was inevitable. Today human population is around 8 billion and it is only increasing. Although the density of the population is not equally distributed on our planet, the overall effect is felt by all. The overall effect or in other words Global warming is the main introducer of events that negatively influence not just people but other living form too. Global warming disturbs well established system and hence introduces challenges that put our existence under a question [1].

The other issue with overpopulation is the need for the provision increase. With the population raise, the increase in production rate of goods and food must be similarly taken account. With the time passage the emergence of some products (new devices, equipment and so on) also increases. Consequently, production rate increase will put more pressure to the industries that are responsible. In one case it is good for the corporation and manufacturers as it provides a rise in profit. The issue arises when the problem is studied in depth. As we all know, the resources on this planed are limited. More goods and food mean more resources

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needs to be used. In some cases, resources are renewable, but most of the time they are lost or put into a stage, where their usability for the future application is useless. Therefore, the need for new approaches and technologies is a must think for the future and for the present as well.

Precise farming is a promising approach in the agricultural sector. The application of such approach must bring positive impact on environment and for the resource usage [2, 3].

2 Precise Farming

Precise Farming is a practice that came in right time into agricultural sector. It purposes in modern time to handle the challenges that are essential to solve in favor to redeem the bright future. Through use of the latest techniques and approaches, this method achieves higher scores almost in any area if compared to traditional methods. Different sensors, clever programming and mechanics with other equipment makes this approach stand out from others. This technique (PF) is able to minimize the effect on environment and similarly increase the production and quality of the final product.

Adoption of such method where new technologies are used with the new and old approaches to conquer the challenges of different kind, but mostly to fight Global warming. As it was stated, global warming is a phenomenon occurred due to the human interaction and manipulations on certain part of nature. The disturbance of the system is fraught with serious consequences that are the key targets of Precise farming.

By summing up the idea itself, one can notice the clear pattern of its usefulness. Due to its precision in farming, it can introduce more sustainable approaches that are eco-friendly. This approach tends to minimize the waste and the time consumption through, first of all, already mentioned usage of technology, and secondly, non-ending improvements. All it benefits combined together results in production increase, which is the main goal if not the second [4, 5].

3 Technologies Used in PF

This approach is a combination of different ideas, tools, methods, and technologies. Combined together it forms a unique technique that is more convenient than old approaches stack together. This approach is flexible and can be adopted for different farming aims at any stage. The technological component of this approach is the main one that enriches it with the capabilities it has. Therefore, this section will be devoted to the technological parts.

The first part that elevated agricultural sector is mechanical improvement, and also it is a major part in precise farming. Mechanics or robots are essential parts in modern industries that allow mass production that we have today. The variety of mechanisms depends on the tasks and production type. Of course, the soul of the mechanism today is algorithms that widens the capabilities. AI development and its improvement allowed different industries to implement them as well into different areas that boost the production to a dramatic value. The usage of AI allows precision in any field that reduces the waste in any forms and increases the overall quality of the product. However, AI can not perform it function without some sensing equipment. The following equipment can be used with AI to enrich its abilities: cameras, microphones and position and pressure sensors and other sensing devises. IoT is another example of how wide specter has precise farming. IoT is well embedded into the existing systems for their overall performance boost. There are many other technologies used to refine agricultural sector, where the main goal is production, sustainability and efficiency [6, 7].

4 Benefits of PF

As it was mentioned many times in this work, invasive species are bad for the environment and for livings. Therefore, some approaches must be taken to stop the harmful side of these species. In modern days, technologies improved to degree, where their capabilities are so much vast that they can be utilized in any fields. They promise countless tools that can be utilized in controlling and monitoring the spread of invasive species. Therefore, this section will be devoted to exploring what are the common tools or technology used in this field and how they can be improved in the future [8].

4.1 Yield increase

First thing that is provided by precise farming, increase in yield, as it was stated many times in this work. This is because of the clever algorithms that monitor, analyses and acts in favor to deal with the issue at its core. For example, usage of AI technology allows identifying any paths that are not complying with the initial status. Identify sickness by analyzing data from cameras (photos and videos) and from other sensors. The data can show the different issues such as brown lives, lives with insects unhealthy or damaged plants and so on. These data can be used in decision-making for finding solution. IoT technology used to transfer information to each other, so other mechanisms can start acting. In case, where pests are the issue in the field, the drone with the necessary chemicals will be signaled to fly over the infested area and release the chemicals. Also, predictive tools are used by analyzing big data and acting earlier to avoid any problems with growing crops or any other vegetation. [9, 10].

4.2 Less resources used

Resources in our planet are limited and some of them are not recyclable. This statement is well welcomed within this method as it tries to utilize only necessary amount of resources by utilizing technologies that were mentioned above. From one point of view it is good for waste control and therefore cost effect, but from another angle, which most important one, is the dose delivery. Too much water or fertilizers can negatively effect the plans, and similarly less also leads to the same issues [11].

4.3 Sustainability of the PF

Our planet is going through difficult tame in terms of loss of ecosystems or their alternations. The sudden shifts of climate are a result of global warming that is caused by the desire of people to live in comfort. However, sometimes we use things that are not near of providing comfort, but they are still produced and used. Overpopulation aggravated this situation of overconsumption, and hence we live with the consequence of it. to solve the issues of such events, new approaches and technologies are invented and implemented in different industries and areas. Precise farming allows to at least get closer to solving some of the issues that are in the air. One of the solutions of the approach is reduction of waste. Due to the use of precise technique, the approach is able to achieve this waste reduction. It also allows to prevent unwanted cases through usage of big data, which also reduce the waste and unwanted negative effect on our environment.

5 Drawbacks of the Approach

5.1 Initial cost

With the positive side comes negative side also. This approach as others has its drawbacks. Some of which are negligible, but there are some that repulses farmers using or embedding it partially in their practices. The first and most severe case of repulsion of it use is its initial cost. It might be all good and easy on the papers, but it is expensive to embed into the existing system or start from the scratch. The second thing is the necessity of losing workforce, which is good for industries and bad for the employees. Also, the stuff that is left need to study new skills as new approach (precise farming) has different tactics or ways if compared to old methods.

5.2 New regulations

New regulations that are daily changing has another layer of uncertainties for those who already utilized it. at first, new regulations are introduced to utilize methods that are eco-friendlier. However, usage of some technology could lead to uncertainties. For example, new laws and regulations makes it hard to fully utilize drones and other flying sources, which cuts out some opportunities. The use of AI is in question, as there was debated by the scientist in this field pushing the petition to stop or at least slow the development of the technology. There are other unpredicted issues, as the technology is debatably new.

5.3 The loop of issues

Indeed, this technology is greater than some of the other approaches. However, there are always some parts that make it question. This method is utilized to lower the cost and increase the quality and production. It is identified and described as the technology that produces less waste and with eco-friendlier approaches. The thing is that overpopulation and critical level of consumption led us into these problems such as global warming and other derivative issues from it. By trying to achieve less waste, we use a lot of technology and consequently materials that needs to be made in enormous amounts. This is the same thing, but unnoticeable for the naked eye to see it at first. But diving a bit deep, it is the same production of things.

6 Conclusion

To conclude, this work was done to outline the use of precise farming in agricultural sector. Due to the unwanted challenges and unclear future, new approaches are implemented in modern practices. Therefore, this work tries to illustrate what is precise farming is and the objective it covers. The main focus of the work is to show the technological side of the approach and how it has effect on sustainability. Also, the advantages and some drawbacks were covered to better understand the technology (approach) in depth.

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