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Precision nutrition addresses the inherent variability in soil composition and plant health by leveraging advanced technologies to precisely deliver nutrients where they are needed. The use of sensors allows farmers to gather real-time data on soil conditions, enabling informed decisions on fertilizer composition and dosage. By tailoring nutrient delivery to the specific requirements of each crop, farmers can optimize growth conditions and enhance overall productivity.

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The integration of sensor technologies, satellite imaging, and automated machinery has been instrumental in the progress of precision nutrition. Sensors provide granular insights into soil health, enabling farmers to make on-the-spot adjustments to fertilizer applications. Satellite imaging offers a macroscopic view of entire fields, facilitating the identification of spatial variations in soil fertility. Automated machinery equipped with precision application systems ensures accurate and efficient nutrient distribution, reducing

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As 166e)5(6.1hn467log)24y co1261905fn19ues t66 e)8(867V(866(16ws 0) looks promising. Continued advancements in artificial intelligence, machine learning, and robotics are expected to further enhance the precision and efficiency of fertilizer application. The increasing availability of affordable technology and the dissemination of knowledge will likely contribute to wider adoption, bridging the gap between precision agriculture and smallholder farmers.

Precision-nutrition represents a significant leap forward in the quest for sustainable and efficient agriculture. The integration of advanced technologies has led to reduced environmental impact, increased crop yields, and improved resource efficiency. As the agricultural sector continues to evolve, precision nutrition will play a pivotal role in ensuring food security and sustainable growth.

While precision nutrition holds immense potential, challenges remain. Initial costs associated with acquiring and implementing advanced technologies can be a barrier for some farmers, especially in resource-constrained settings. Additionally, the need for farmer education and the development of user-friendly technologies are crucial for widespread adoption. The integration of big data analytics allows farmers to make sense of the vast amount of information collected from sensors and other sources. This analytical approach enhances the predictive capabilities of farmers,

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1. Ahmad Nazarudin MR, Mohd Fauzi R, Tsan FY (2007) Effects of paclobutrazol on the growth and anatomy of stems and leaves of *Syzygium campanulatum*. *J Trop Forest Sci* (2): 86-91.
2. Ahmad Nazarudin MR, Tsan FY, Mohd FR. (2012) Morphological and physiological response of *Syzygium myrtifolium* (Roxb) Walp. to paclobutrazol. *Sains Malays* 41(10): 1187-1192.
3. Alkassawneh NM, Karam NS, Shibli RA (2006) Growth and flowering of black iris (*Iris nigricans* Dinsm.) following treatment with plant growth regulators. *Sci Hort* 107: 187-193.
4. Almekinders CJM, Struik PC (1967) Shoot development and flowering in potato (*Solanum tuberosum* L.). *Potato Res* 39: 581-607.
5. https://link.springer.com/chapter/10.1007/978-94-017-8026-1_3
6. <https://www.worldcat.org/title/rank-correlation-methods/oclc/3827024>
7. <https://onlinelibrary.wiley.com/doi/abs/10.1002/loc.988>
8. Anders C, Bargsten K, Jinek M (2016) Structural plasticity of PAM recognition by engineered variants of the RNA-guided endonuclease Cas9. *Mol Cell* 61(6): 895-902.
9. Blomme G, Jacobsen K, Ocimati W, Beed F, Ntamwira J, et al. (2014) Fine-tuning banana *Xanthomonas* wilt control options over the past decade in East and Central Africa. *Eur Journal of Plant Pathology* 139: 265-281.
10. Callaway E (2018) CRISPR plants now subject to tough GM laws in European Union. *Nature* 560: 16-59.