

# Variable Rate Technology (VRT) Market Forecasts to 2032 – Global Analysis By Type (Fertilizer VRT, Crop Protection VRT, Seeding & Planting VRT and Other Types), Crop Type, Farm Size, Technology, End User and By Geography

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## Abstracts

According to Statistics MRC, the Global Variable Rate Technology (VRT) Market is accounted for \$9.2 billion in 2025 and is expected to reach \$21.7 billion by 2032 growing at a CAGR of 13% during the forecast period. Variable Rate Technology (VRT) is a precision agriculture approach that uses data-driven insights to apply farm inputs—such as seeds, fertilizers, pesticides, and water—at varying rates across a field. Instead of treating the entire field uniformly, VRT adjusts input levels based on soil conditions, crop needs, and spatial variability detected through sensors, GPS mapping, and analytics. This targeted application improves resource efficiency, reduces waste, and enhances crop productivity. By optimizing inputs at specific locations, VRT supports sustainable farming practices, lowers costs, and minimizes environmental impacts. It enables farmers to make smarter, site-specific decisions that boost overall farm performance.

### Market Dynamics:

Driver:

Rising demand for precision farming efficiency

Farmers are increasingly adopting advanced technologies to optimize input usage, reduce waste, and enhance crop yields. VRT enables site-specific application of fertilizers, pesticides, and seeds, which directly improves productivity while lowering

operational costs. This efficiency gain is particularly critical as global food demand continues to rise, pressuring agricultural systems to maximize output. The integration of VRT into modern farming practices also aligns with sustainability goals, reducing environmental impact through controlled resource application.

#### Restraint:

##### High initial investment and integration costs

Farmers must invest in GPS systems, sensors, software, and compatible machinery, which can be prohibitively expensive for small and medium-sized enterprises. Beyond equipment, integration requires technical expertise and training, adding to the overall financial burden. Many regions with fragmented landholdings struggle to justify the cost of VRT deployment, limiting adoption rates. Additionally, the return on investment may take several seasons to materialize, discouraging risk-averse farmers. These financial and operational hurdles act as significant restraints to widespread VRT implementation.

#### Opportunity:

##### Growing adoption of GPS-guided equipment

Precision navigation systems allow farmers to apply inputs with remarkable accuracy, reducing overlaps and minimizing resource wastage. As GPS technology becomes more affordable and accessible, its integration with VRT systems is accelerating. This trend is further supported by government initiatives promoting smart agriculture and subsidies for advanced farming equipment. The combination of GPS guidance with VRT enhances operational efficiency and strengthens data-driven decision-making. Consequently, the expanding use of GPS-guided equipment is expected to unlock substantial growth opportunities for the VRT market.

#### Threat:

##### Lack of skilled operators for VRT

Advanced technologies require trained personnel capable of managing sensors, software, and precision machinery. In many regions, farmers lack the technical expertise to fully utilize VRT capabilities, leading to underperformance or system misuse. Training programs are limited, and knowledge transfer is slow, particularly in developing economies. This skills gap hampers adoption rates and reduces the

effectiveness of installed systems. Without adequate operator training, the potential of VRT to transform agriculture may remain underutilized, posing a long-term threat to market growth.

#### Covid-19 Impact:

The COVID-19 pandemic had a mixed impact on the VRT market. Supply chain disruptions delayed equipment deliveries and restricted access to spare parts, slowing adoption in several regions. Farmers faced financial uncertainty, which reduced their willingness to invest in high-cost technologies during the crisis. However, the pandemic also highlighted the importance of automation and efficiency in agriculture, driving renewed interest in precision farming solutions. Remote monitoring and digital platforms gained traction, supporting VRT integration despite physical restrictions.

The cereals & grains segment is expected to be the largest during the forecast period

The cereals & grains segment is expected to account for the largest market share during the forecast period driven by the global reliance on staple crops such as wheat, rice, and corn. Rising population growth and increasing food demand are pushing farmers to adopt precision technologies that maximize yields in these essential crops. VRT enables site-specific fertilizer and seed application, which is particularly impactful in large-scale cereal and grain farming. The efficiency gains achieved through VRT adoption reduce costs while improving productivity, reinforcing its importance in this segment. Additionally, cereals and grains benefit from government support programs that encourage sustainable farming practices.

The soil sensing VRT segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the soil sensing VRT segment is predicted to witness the highest growth rate due to its ability to provide real-time insights into soil conditions. Farmers are increasingly adopting soil sensors to monitor nutrient levels, moisture, and pH, enabling precise input application. This technology reduces waste and enhances crop yields, making it highly attractive for modern precision farming. The affordability and accessibility of soil sensors are improving, accelerating adoption across both developed and emerging markets. Integration with GPS-guided systems further strengthens the value proposition of soil sensing VRT. As a result, this segment is projected to expand at the fastest pace among all VRT technologies.

### Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share driven by rising demand for precision farming efficiency. Advanced agricultural infrastructure and widespread mechanization have positioned the United States and Canada at the forefront of VRT adoption. Farmers in this region are leveraging GPS-guided machinery and soil sensing technologies to optimize resource use and maximize yields. Strong government support and sustainability initiatives further reinforce the region's leadership in precision agriculture. The presence of leading agritech companies and continuous innovation also contribute to North America's dominance.

### Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR owing to rapid agricultural modernization and rising food demand. Countries such as China, India, and Australia are accelerating adoption of VRT technologies. Farmers are increasingly aware of the benefits of precision input management, particularly in meeting the region's growing food demand. Government subsidies and initiatives promoting smart farming are further boosting adoption rates. Expanding mechanization and the availability of affordable GPS and soil sensing equipment strengthen the region's growth trajectory. Consequently, Asia Pacific is expected to be the fastest-growing region in the global VRT industry.

### Key players in the market

Some of the key players in Variable Rate Technology (VRT) Market include Deere & Company (John Deere), AGCO Corporation, CNH Industrial, Kubota Corporation, Trimble Inc., Topcon Corporation, Raven Industries, AG Leader Technology, Hexagon AB, Lindsay Corporation, Valmont Industries, Yara International ASA, Farmers Edge Inc., Climate LLC and Taranis.

### Key Developments:

In February 2024, AGCO announced the acquisition of Intelligent Agricultural Solutions (IAg) from Cornex. This strategic move significantly enhanced AGCO's precision agriculture portfolio by integrating IAg's industry-leading FieldAlytics platform, a powerful farm management software that is crucial for creating.

In January 2023, Deere launched the ExactShot planting system, a revolutionary VRT application. This technology uses sensors and robotics to precisely place starter fertilizer directly onto seeds as they are planted, rather than applying a continuous stream.

#### Types Covered:

Fertilizer VRT

Crop Protection VRT

Seeding & Planting VRT

Irrigation VRT

Soil Sensing VRT

Other Types

#### Crop Types Covered:

Cereals & Grains

Oilseeds & Pulses

Fruits & Vegetables

Commercial Crops

#### Farm Sizes Covered:

Large-Scale Commercial Farms

Medium Farms

Smallholder Farms

Technologies Covered:

GPS-Based VRT

GIS-Based VRT

Map-Based VRT

Sensor-Based VRT

Other Technologies

End Users Covered:

Agricultural Cooperatives

Research Institutions

Agri-Tech Companies

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

**What our report offers:**

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

**Free Customization Offerings:**

All the customers of this report will be entitled to receive one of the following free customization options:

**Company Profiling**

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

**Regional Segmentation**

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

**Competitive Benchmarking**

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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