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TGR is being applied in a residential backyard.

Tree Growth Regulators Go Mainstream at PG&E

The California utility partnered with a contractor and stakeholders to integrate TGRs into its UVM program.

By **KARSTEN SCHULZ** and **JOSEPH STEWART**, Pacific Gas & Electric, and **BRANDON HUGHSON** and **ROBERT GRABOWSKI**, Rainbow Tree Company

Tree growth regulators, commonly known as TGRs, have been around for decades and are well known in the utility vegetation management (UVM) industry. However, they tend to be viewed as a limited use specialty tool as opposed to the traditional tools such as the chainsaw, bucket truck and chipper.

Years of research and development have shown the latest generation of TGR methodology to be predictable, safe, and reliable. Despite this, TGRs have not yet found their way into the mainstream as a serious challenger to the chainsaw.

In 2017, PG&E set out to overcome the obstacles of a TGR program by partnering with a specialty TGR application vendor. This could allow them to get the benefits of an integrated program without the challenges of starting this internally from the ground up. With this partnership, PG&E is well on their way to achieving the long-awaited mainstream potential that TGRs have to offer.

"We are always looking for ways to improve safety and reliability on our electric distribution system," said PG&E's North Valley Senior Manager Adam Bakker.

TGR Overview

Growth regulators have been evolving for more than 30 years. Commonly used by arborists to improve tree health, they are also used in the lawn-care industry and by nurseries for ornamentals and bedding plants. Several types of growth regulators are available. The most common active ingredient used in UVM, paclobutrazol, slows vegetation growth by reducing the production of gibberellic acid, a hormone which causes woody tissue to elongate and thicken. It has no impact on cell division, so the tree is completely intact, just growing slower. Paclobutrazol also improves tree health by allowing for more chlorophyll production, thicker leaves, increased energy storage and a healthier root system that helps combat harsh environmental conditions,



Auditing is key for showing the success and value of the program.

including drought. Paclobutrazol carries the lowest caution label assigned by the EPA and is considered safe and effective by many tree care professionals all over the world.

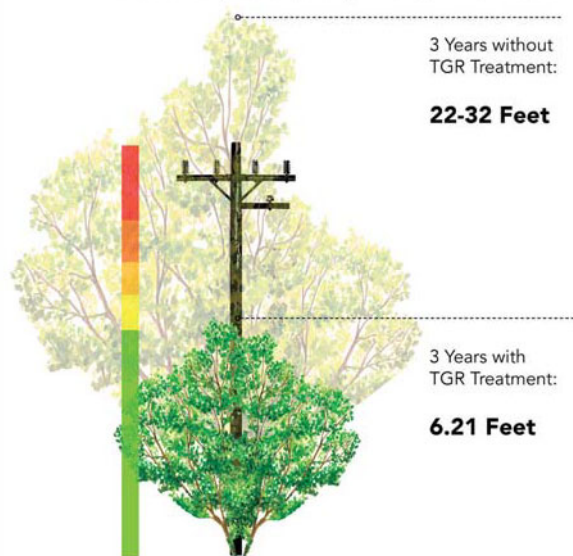
Utilities began using paclobutrazol TGRs in the late 1990s after researchers discovered that treated trees had significantly reduced regrowth resulting in less frequent and severe pruning, reduced wood waste, healthier trees and less cost. PG&E learned that not all paclobutrazol applications were reliable so it was key to partner with a vendor that could bring improved formulations and sophisticated application techniques to the program. After many decades of research, along with the work previously done at



TGRs help reduce repeat visits from pruning crews.

Eucalyptus Regrowth After Pruning

Results 3 years after pruning/treatment



TGRs reduced the growth of rapidly growing species like eucalyptus. Results from actual field data 2017-2020.

PG&E and other utilities, predictability of species response and improved application methods have greatly improved, demonstrating great upside potential through integration into routine UVM operations as alternative to frequent aggressive pruning, particularly on fast-growing problem trees.

Overcoming the Obstacles

The real and perceived obstacles to overcome to get TGRs into mainstream UVM include:

- Inconsistent efficacy due to unreliable treatment methods and accurate dosing
- Customer and community acceptance
- Environmental concerns
- Unknown and unproven costs vs. benefits
- Integration into UVM systems and processes
- Internal utility senior leadership and stakeholder acceptance for a new and unproven technology

These are not insignificant obstacles, any of which could derail efforts to integrate TGRs into a UVM program. To tackle these challenges, PG&E designated a project champion and project manager to steer the project forward. A project team representing internal stakeholders and Growth Solutions, LLC, a contractor of TGR services, was assembled to move the project forward. Internal stakeholders included public affairs, environmental services, customer care and law, among others.

"It was important for us to have people from different departments working together towards our common goal," said Steven Fischer, senior director of vegetation management at PG&E.

The Project Plan

With the help of the contractor partner, PG&E developed a project plan with a compelling business case that defined objectives, scope, deliverables, schedule, cost and success criteria to gain senior leadership approval and funding to move forward. Project

objectives were closely aligned with corporate goals of public and employee safety, reliability, customer satisfaction, environmental sustainability, and affordability.

The project objectives are as follows:

Public and Employee Safety

- Reduce worker and public exposure to UVM activities in high-risk areas such as high-traffic roadways and densely populated communities
- Eliminate off-cycle and high-risk tree conditions

Affordability

- Reduce long term VM maintenance cost through extended maintenance cycles
- Improve resource utilization
- Increase program reinvestment opportunities

Environmental

- No adverse environmental impact
- Reduce greenhouse emissions relative to traditional UVM methods supporting corporate sustainability efforts
- Reduce biomass disposal relative to traditional UVM methods
- Improve health of the urban forest

Customer Satisfaction

- Improve customer satisfaction by introducing an alternative to traditional UVM work
- Fewer intrusions onto customer property and less invasive work to meet UVM objectives

The Project Team

Including stakeholders early in the process added credibility to the project, allowing their voices to be heard and concerns addressed, thus avoiding difficulties later in the project. Roles and responsibilities were clearly defined in the proposed project plan.

- Vegetation Management – project initiator, champion and project manager.
- Corporate/Public Affairs – identify potential external stakeholder concerns and gaps, assist in developing customer notification/communication/escalation protocols and collateral materials, and early stakeholder outreach.
- Environmental Services – A California Licensed Agricultural Pest Control Advisor assessed environmental concerns, application protocols and restrictions.
- Law Department – consultation through program development.
- Vendor Partner of TGR Services – expert project consultation, provide turnkey process from on-the-ground customer/community outreach and communication, staff training, notification, product application, program/systems integration and quality control.

Project Scope

The TGR Integration project was designed in three phases starting with planning and preparation, for a limited “opt-in” pilot where written property owner approval was obtained prior to TGR application, and pilot results were measured against defined success criteria. If the pilot results met project objectives and success criteria, the project would be rolled out to additional areas under an “opt-out” program where property owners would



TGRs are ideal for trees in difficult-to-access sites.

be notified with an informational/FAQ door hanger of TGR application, with the option to “opt-out” rather than “opt-in.” Past project experience showed a proper rollout is crucial to making this a success.

PG&E's TGR vendor partner performed much of the heavy lifting associated with planning, preparation and execution of the project plan under the direction of the utility.

PG&E's TGR Project Scope Timeline:

Phase 1 – Pilot Planning and Preparation

- Develop robust communication materials, staff training and PG&E stakeholder support
- Selection of two pilot areas (divisions)
- Advanced external stakeholder outreach, to include key city/county governments, community leaders, and Non-Governmental Organizations (NGO's) such as local tree organizations and interest groups, to include endorsements from key stakeholders where available
- Collaborate and partner with city/county/agencies and community organizations to help advance their goals of improving the health of the urban forest
- Develop business processes and integrate into existing routine distribution vegetation patrols, including data collection, customer contact, pricing mechanisms, and physical work activities
- Evaluation of environmental risks associated with TGRs
- Develop success criteria and an extensive evaluation process to assess opportunities and risks associated with the transition to a full implementation ‘opt-out’ program. Including items such as:



A TGR technician arrives at the site.

- Tracking property owner contact within GIS platform to ensure refusal customers are documented and questions/concerns are addressed.
- Success rates, and issues and responses
- Assess community acceptance, potential barriers, opportunities, and reputational risk
- Validate cost/benefit assumptions related to extended pruning cycles

Phase 2 – Pilot “Opt-In” Implementation

- Execute limited “Opt-In” TGR program in selected areas
- Assess customer, financial, and operational performance against established success criteria
- Monitor and adjust
- Business process and documentation
- Internal roundtable on next steps, which could include moving to Phase 3 or expanding Opt-In

Phase 3 – “Opt-Out” Implementation Beyond Pilot Areas

- Contingent on Phase 2 outcome; authorization to proceed



Data collection is an ongoing part of the audit and quality control of the program.



Trees are measured to determine the individual dose.

Project Results to Date

PG&E completed Phase 1 (planning and preparation) in late 2017, rolling directly into Phase 2 (pilot) through second quarter 2018, and quickly moved into Phase 3 (opt-out) by the end of the year. TGR integration was expanded into additional divisions bringing the number to seven of 16 divisions by spring 2019 with plans to continue moving forward in 2021 and beyond.

Specific results

Customer and community acceptance – an early concern raised by internal stakeholders was how people would react to a “chemical” being applied to their tree. The early work developing communication protocols, engaging stakeholders at all levels, and preparing paid big dividends. Opt-in acceptance exceeded 95% with few escalated events.

- Customer refusals were reduced by offering a TGR alternative to frequent intrusions on customer property and aggressive pruning.
- Several cities provided blanket approval for TGR application on city-owned trees.
- State transportation departments provided blanket approvals for TGRs on state-owned highways to reduce UVM work encroachments causing lane closures and public/worker safety issues.
- Partnerships were developed with local tree and interest groups endorsing TGRs.

Product and application efficacy – improved product formulations, soil injection protocols, and dosing rates greatly improved growth regulation on many of the most troublesome trees. PG&E relied on its vendor’s continuous research and development efforts to determine specific site applications in an order to gain control of its most problematic species.

Growth Solutions, LLC control audits demonstrated more than 95% efficacy. Certain species of tree and/or environmental factors such as soil type were the biggest contributor to the 5% failure rate triggering additional research by the TGR service provider to fine tune dosing and application. Trees requiring off-cycle bi-annual and annual pruning have been reduced by more than 90%. Post-application assessments have demonstrated tree growth reductions of 95%, extending



A side-by-side of an untreated (left) and TGR treated tree (right) showing the reduction in growth of a live oak.

pruning event cycle to three or more years.

Cost benefit – The impact of this program when fully integrated is such that about two-thirds of pruning requirements that existed prior to the adoption of the program are removed from the maintenance cycle. The financial return on investment and the ancillary benefits (customer satisfaction, increased public and worker safety, better way to maintain compliance) were substantial.

Project Challenges and Opportunities

There were some escalated events by concerned parties, not usually the customer or property owner. Few and infrequent, they were handled quickly thanks to early preparation and fully engaged internal and external stakeholders.

Some treated trees were prematurely re-pruned due to lack of understanding by pre-inspection or tree contractors. This was overcome through additional training provided by the TGR service provider and by clearly identifying treated trees with physical and digital markers.

Looking Forward

UVM is one of the costliest programs for overhead line maintenance, among the highest contributors to power outages, public safety incidents (fires and electrocutions) and tree worker safety incidents. The nature of UVM also makes it one of the most controversial activities performed by most utilities, as cutting of trees has significant impacts on the urban forest.

TGRs have come a long way with potential to dramatically alter the paradigm of UVM, with huge benefits in employee and public safety, reliability, customer satisfaction and cost.

“It’s all about fully using the technology available to us and TGRs are another tool in our toolbox to manage vegetation in our ROWs,” Bakker said. Specialized application contractors may be that missing link that finally gets TGRs into the mainstream. **TDW**

KARSTEN SCHULZ (Karsten.schulz@pge.com) is a supervising vegetation program manager for Pacific Gas and Electric Company (PG&E). He has worked in utility vegetation management since 2000 and has held a variety of positions in operations and quality assurance. He holds a BS in Forestry from the University of Applied Sciences, Eberswalde, Germany; is a Certified Arborist/Utility Specialist with the International Society of Arboriculture (ISA) and a Certified Project Management Professional (PMP) with the Project Management Institute (PMI).

JOSEPH STEWART (Joseph.stewart@pge.com) is a supervising program manager for Pacific Gas & Electric. He has 22 years of experience in the utility vegetation management industry. He holds a B.S. in Biology from the University of New Mexico, an M.B.A. from the University of Phoenix, and is an ISA Certified Arborist/Utility Specialist.

BRANDON HUGHSON (Bhughson@gs4trees.com) is the director of VM services at Rainbow Tree Company. He holds a BS in Geography from Minnesota State University, Mankato. Brandon has worked in several roles within Rainbow including GIS Tree Inventory Specialist/ Analyst and Technical Arborist. He is an ISA Certified Arborist; Brandon serves on the UAA Executive Board as a Director and serves on numerous UAA committees. In 2016, Brandon was awarded the Rising Star Award from the Utility Arborists Association.

ROBERT GRABOWSKI (rgrabowski@gs4trees.com) is the utility program developer at Rainbow Tree Company. He has been in utility vegetation management business since 2012, serving in many roles such as consulting utility forester, supervisor consulting utility forester, trainer and contract vegetation program manager.



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