SAFEROCK® STATEMENT ON

SUSTAINABLE AGRICULTURAL PRACTICES

Pomerite®

SafeRock®

A natural resource to enrich the earth

Life of the Soil

According to the United Nations, the world's population is expected to increase by nearly 2 billion persons in the next 30 years, from the current 8 billion to 9.7 billion in 2050 and could peak at nearly 10.4 billion in the mid-2080s. The challenges this exponential growth poses to ensuring adequate food supply and efficient waste disposal are becoming increasingly critical. These issues, integral to the survival and prosperity of humanity, necessitate a profound transformation of our prevailing agricultural and waste management practices to mitigate their adverse impacts on global ecology and climate.

It is now imperative for our society to pioneer innovative strategies that enable the cultivation of food without inflicting harm on surrounding ecosystems, contaminating water bodies, or endangering organisms. In this context, the utilization of the **SafeRock®** product, **Pomerite®**, emerges as a promising solution. **Pomerite®** is a natural soil conditioner which enhances the sustainability of agricultural practices through the promotion of closed-cycle methodologies.

Pomerite® distinguishes itself by its ability to invigorate soil health. It fosters the activity of earthworms and other beneficial organisms ubiquitous in soils worldwide, thereby playing a crucial role in the revitalization of soil ecosystems. When applied to soil, **Pomerite®** exerts a profound regenerative effect, contributing to the re-establishment of balanced soil ecology. This, in turn, facilitates increased yields in organic agriculture, while simultaneously addressing the issue of oxidative stress in plants and humans.

In 2016-17, **Pomerite®** was extensively trialled within an agronomic and microbiological study in the rice-wheat cropping system by the Division of Microbiology, Indian Agricultural Research Institute (IARI), New Delhi, India. In every single case within the rice and wheat trials, increasing the applied dose of **Pomerite®** led to significant increases in soil microbiological content and activity, as well as producing impressive increases in soil nutrient availability, nutrient uptake, increased yields, and concomitant increases in product quality in both the rice and wheat crops.

A Pathway Towards a Sustainable World

The strategic adoption of **Pomerite®** within agricultural practices offers a pathway towards achieving sustainable food production. By aligning farming methods with the principles of environmental stewardship, it becomes possible to confront and surmount the dual challenges of food security and ecological preservation. Hence, **Pomerite®** stands at the forefront of efforts to transition towards agricultural systems that are not only productive but also harmonious with the natural world.

Microorganisms and Soil

Sir Albert Howard's assertion in 1940, that "the maintenance of the fertility of the soil is the first condition of any permanent system of agriculture," underscores the foundational principle that soil health is paramount for sustainable agriculture. The Earth-Saving vision, rooted in deep ecology, posits that beneficial microbes play an indispensable role in sustaining life on Earth. These microbes, with their fermenting, photosynthetic, nitrogen-fixing, and gas-exchanging capabilities, have been instrumental in shaping the Earth's atmosphere, water, and soil, thus enabling the existence of complex life forms.

Microorganisms, as the architects of soil, not only constitute its vitality but also form a significant part of our own bodily health. The recognition that we are essentially walking communities of bacteria prompts a re-evaluation of our relationship with our environment, viewing it as an evolutionary mosaic of microbial life. This perspective steers us towards modifying our agricultural practices to align with the natural processes of the biosphere.

Key points include:

- **Microbial Origin of Soil:** Microorganisms are the pioneers of soil formation, creating "microbial mats" for photosynthesis. Over millennia, these organisms transformed the mineral substratum into organic compounds, leading to the development of humus-rich soil, which became the bedrock for the earliest plant life.

- **Soil as a Living System:** Soil is a dynamic, living system that interacts with plants and the atmosphere within the web of life. Healthy soil ecology, facilitated by a balanced microbial food web, offers natural protection against diseases and parasites.

- **Role of Microorganisms:** These organisms are crucial for decomposing organic matter into humus, enriching the soil with nutrients and hormones essential for plant growth. They enhance soil structure, assist in nutrient retention, and contribute to greenhouse gas sequestration. Specifically, soil microorganisms play a role in mitigating methane, a significant greenhouse gas, by oxidizing atmospheric methane.

- **Impact of Modern Agriculture:** Intensive agricultural practices disrupt this ancient equilibrium, resulting in soil degradation, groundwater contamination, and adverse health effects on organisms, including humans. Such practices, reliant on high chemical inputs, erode the microbial life that underpins soil fertility.

The Foundation for Sustainable Agriculture

The discourse emphasizes the necessity of transitioning from a perception of soil as an inert medium to be chemically sustained, towards recognizing soil as a vibrant organism essential for sustainable farming. This shift involves appreciating the synergy among soil elements and microorganisms and adopting agricultural practices that nurture soil health. Ultimately, maintaining the vitality of the soil emerges as the rational foundation for sustainable agriculture, heralding a return to practices that honour the soil's living essence.

Pesticides, Fungicides and Fertilizers are Toxic to Life

DDT (Dichlorodiphenyltrichloroethane) was first synthesized by the chemist Paul Herman Mueller in 1939, a discovery that later earned him a Nobel Prize in 1948. Since Mueller's ground breaking work, the agricultural industry has seen the introduction and registration of over 600 different chemical agents designed for pest control. According to estimates by the Environmental Protection Agency, global expenditure on pesticides reached approximately 25 billion dollars in a single year, with Monsanto reporting sales exceeding one billion dollars for its 'Roundup' herbicide alone. The global consumption of pesticides has escalated to 2.6 million metric tons, 85% of which is utilized within the agricultural sector.

The consequences of such widespread pesticide use on soil ecology, biodiversity, groundwater quality, and human health are profound and multifaceted:

- **Impact on Soil and Agricultural Pests:** Pesticides lead to the demise of essential microorganisms, resulting in soil devoid of nutritive qualities and the removal of beneficial predators that naturally control agricultural pests. This imbalance often necessitates even greater pesticide use, with the U.S. experiencing a doubling of crop losses to pests over 50 years despite intensive pesticide application.

- **Birdlife Mortality:** The U.S. Environmental Protection Agency has estimated that the insecticide Carbofuran is responsible for the deaths of 1-2 million birds annually in the U.S. alone, highlighting the severe impact of just one of the numerous agrochemicals in use.

- **Aquatic Wildlife:** Pesticide contamination of watercourses has led to significant mortality among aquatic organisms, with an estimated 6-14 million fish deaths attributable to pesticides annually.

- **Climate Change Contribution:** Agricultural practices can significantly reduce the soil's capacity to oxidize atmospheric methane—a critical greenhouse gas—especially when compared to forest soils. Pesticides disrupt the methane-oxidizing bacteria, potentially affecting the global methane budget over long periods.

- **Economic and Environmental Costs:** The use of pesticides incurs high costs due to increased pest resistance, pollution of agricultural soils, and the extensive energy requirements for modern farming practices. These activities contribute to ozone pollution and global warming, posing a threat to human civilization through the potential for catastrophic natural disasters.

- **Endocrine Disruption:** Sparse research into the cumulative effects of agricultural chemicals suggests significant risks of mutagenic, immune system, and endocrine system disruptions in both wildlife and humans. The Food and Drug Administration (FDA) reports that a significant percentage of food purchased by consumers contains detectable levels of pesticide residues, with some exceeding legal tolerance levels.

- **Genotoxicity:** Genetic mutations caused by pesticide exposure can have profound implications for both current and future generations. Studies have shown positive results for chromosomal damage in humans exposed to pesticides, suggesting an urgent need to reduce pesticide residue levels in food through proper application and good agricultural practices.

The myriad of issues presented by the use of pesticides emphasise the critical need for solutions aimed at stabilizing and regenerating environmental quality and ensuring the sustainable provision of food for all life on Earth. This calls for a concerted effort to transition towards more sustainable agricultural practices that prioritize ecological health and safety.

"All these problems need solutions to stabilize and regenerate the quality of the environment and provision of food for humankind and all forms of life on Earth" - HRH THE PRINCE OF WALES, 1998.

The Agricultural use of Effective Microorganisms

On May 31, 2002, the esteemed journal Science published a groundbreaking article on organic agriculture, marking a significant milestone in agricultural research. This publication detailed the outcomes of the world's inaugural long-term investigation into organic crop production. The study, extending over a period of 21 years, revealed that despite a 50% reduction in the expenditure on fertilizers and energy, alongside a dramatic 97% decrease in pesticide usage, the yields from organic crops were only modestly reduced by an average of 20%. Furthermore, it illuminated the profound benefits of organic farming practices, including the enhancement of soil health, the preservation of biodiversity, and the maintenance of diverse microbial communities.

This pivotal research challenges the prevailing market-driven paradigms of agribusiness, which predominantly benefits the petrochemical industry, thereby questioning the sustainability of current agricultural models. In the quest for more sustainable and environmentally friendly farming practices, the role of natural soil conditioners becomes increasingly significant. One such product making a substantial impact is **Pomerite®**, a naturally occurring substance discovered in Northern Ireland, which has been recognized for its remarkable soil remediation properties.

Pomerite® is adept for both organic and commercial farming contexts, with its application through standard spreading techniques aimed at rejuvenating the soil, enhancing crop yields, and augmenting the nutritional quality of food products. It has demonstrated a potent ability to restore balanced soil ecology and to mitigate oxidative stress in both plants and humans. The efficacy and potential benefits of **Pomerite®** are gaining international recognition, supported by a wealth of soil analysis data, scholarly literature, and a series of successful trials conducted across a diverse array of crops and soil types globally.

Global Trials Result in Enhanced Crop Production and Yields

Trials conducted across various regions, including America, India, China, and Africa, have revealed significant enhancements in crop production and yield. These improvements were evident in a broad spectrum of agricultural products, such as maize, lettuce, and various fruits and berries, including grapes. A notable contrast was observed in the performance of soils treated with **Pomerite®** compared to those dependent on chemical fertilizers during the growth cycles. These results highlight the transformative impact of **Pomerite®** in promoting sustainable agricultural practices, marking a significant transition towards methods that are both economically sound and environmentally sustainable.

Pomerite®: Anti-oxidation and Nutrition

Over the last thirty years, accumulating evidence has increasingly demonstrated that both malnutrition—including dietary deficiencies in nutrients such as protein, selenium, and zinc—and the excess intake of certain nutrients (for instance, iron and vitamin C) can lead to the oxidation of biomolecules and cellular damage. A substantial volume of research underlines the critical role that dietary antioxidants play in safeguarding against a myriad of human diseases.

In the contemporary environment of industrially advanced nations, the populace is continually exposed to novel pollutants emanating from industrial activities, vehicular emissions, and synthetic materials within our living spaces. The prevalence of free radicals in our environment has surged, manifesting in various forms including hydrocarbons, aerosols, sulphur dioxides, and nitrogen oxides. When exposed to sunlight, combinations of nitrogen oxides and reactive organic compounds generate ozone, peroxyacetyl nitrate, and other photochemical oxidants, inflicting damage on organisms through free radical oxidation. The Intergovernmental Panel on Climate Change has projected that a global temperature rise of 4°C could amplify photochemical oxidants in certain regions of the U.S and Europe by as much as 20%. It is within this context that the antioxidants found in foods assume a pivotal role in neutralizing free radicals, thereby thwarting numerous diseases.

Phenolic and polyphenolic compounds, such as flavonoids and catechins found in edible plants, are recognized for their robust antioxidant capabilities, serving as principal defenders against oxygen free radicals. The availability of these antioxidant nutrients is contingent upon the presence of healthy soil bacteria, which facilitate the synthesis and conveyance of nutrients into plants, thereby ensuring the nutritional efficacy of the produce consumed.

The advent of industrial agriculture, with its heavy reliance on chemical inputs, has exacerbated malnutrition and reduced resistance to oxidative stress. This is attributed to the detrimental impact of agricultural chemicals on antioxidizing soil microorganisms, which are instrumental in the biogenesis and transport of essential nutrients to plants. A compromised soil ecosystem results in plants devoid of sufficient nutritional content, leading to a diminished intake of antioxidants by the consumer.

Consequently, the loss of nutrients and antioxidants can precipitate malnutrition, characterized by dietary deficiencies in protein, selenium, and zinc, which in turn can catalyse the oxidation of biomolecules and precipitate cellular injury. The incorporation of **Pomerite®** into soil represents a viable strategy for mitigating these issues. According to agricultural scientist Don Dysart, the synergy between plants and soil microorganisms is fundamental to nutrient acquisition. Beneficial microorganisms in the rhizosphere enhance the plant's ability to assimilate antioxidizing nutrients more efficiently than through direct absorption from fertilizers. These microorganisms metabolize to produce nutrients in forms that are readily available to plants, thereby 'spoon-feeding' essential elements directly to the root hairs.

A Critical Need for Dynamic Change

This significant change in approach highlights the critical need to prioritize soil health as the bedrock for growing plants with strong immune systems and superior nutritional content. Instead of depending on fertilizers in an unproductive, lifeless soil environment, this refreshed viewpoint champions the development of a dynamic, microorganism-enriched soil ecosystem as the key to achieving sustainable and health-enhancing agricultural practices.

Conclusion:
Agriculture and the Cyclic Renewal of Soil Fertility

Maintaining soil fertility and its microbial life is essential for sustainable agricultural practices. In the natural cycle, plants and animals contribute leaves or droppings directly back to the soil, enriching it and completing the nutrient cycle. **Pomerite®** supports and enhances this natural cycle of renewal.

Pomerite® is capable of remediating soils that have been degraded by human activities. Being a natural product, **Pomerite®** is safe to use near watercourses and for handling. Utilizing **Pomerite®** for soil conditioning reconnects agricultural practices with the natural principle of cyclic renewal.

The employment of Pomerite®, a soil conditioner derived from natural resources, offers numerous benefits for soil health and agriculture, applicable in both small-scale domestic and large-scale commercial systems. The establishment of effective micro-organisms in the soil fosters a network of positive interactions, yielding significant advantages:

- **Enhanced resistance to water stress.**
- **Increased carbon mineralization.**
- **Decomposition of residual agrochemicals in the soil.**
- **Improved root penetration.**
- **Boosted plant photosynthesis capacity.**
- **Increased protein activity in plants.**
- **Higher crop yields across various produce including maize, lettuce, onion, rice, papaya, herbage grasses, vegetables, and apples**.

Our current reliance on pesticides, which pose substantial health risks due to their genotoxicity and the environment's inability to metabolize them, calls for a transformative approach. The long-term health and environmental costs associated with pesticides are immeasurable in economic terms.

Embracing soil health and crop diversity can significantly reduce plant susceptibility to diseases and pests. Instead of relying on chemicals alien to the Earth's metabolic processes, adopting competitive exclusion through beneficial soil conditioning offers a sustainable alternative. Healthy, antioxidizing microorganisms in the soil contribute to both soil health and human wellness. With pollution increasing our exposure to free radicals and decreasing our consumption of antioxidants, enhancing the antioxidant nutrient content in food is crucial for maintaining health.

Pomerite® embodies the principles of sustainable industrial ecology by promoting food growth and soil remediation. The global imperative for soil remediation faces challenges from entrenched interests in agrochemical production and distribution. Nevertheless, the push for control over the food chain through patents on life forms and genetically modified foods highlights the urgency of adopting sustainable practices.

Transitioning towards sustainable agriculture might initially need to emerge from grassroots movements, driven by education, consumer choices, and technological innovation for communities and farms transitioning from chemical to organic methods. Increasing awareness of intensive organic agricultural alternatives is vital for facilitating a shift towards sustainability.

Pomerite®'s methodology has the potential to eliminate the need for harmful chemicals in food production, significantly enhancing human health by increasing the intake of antioxidants and nutrients. Moreover, it can mitigate the adverse effects on fisheries, marine wildlife, bird populations, and farm workers, while reducing agriculture's impact on climate change. The application of **Pomerite®** in intensive organic farming not only presents a viable alternative to current harmful practices but also heralds a regenerative system for Earth's healing.

A nation that destroys its soil, destroys itself.

26 February 1937, President Franklin D Roosevelt

SAFEROCK LTD / 113A BROADWAY / LEIGH ON SEA /
ESSEX / SS9 1PG / UNITED KINGDOM

TEL. +44 (0) 1702 873 029

www.saferock.co.uk

Pomerite®

SafeRock®

A natural resource to enrich the earth