PSTC TAPE WEEK 2025

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Is the Use of Natural Rubber in PSAs Sustainable? The Good, the Bad, and the Future.

What is Sustainability

What Does it Mean to be Sustainable?

- Sustainability is the ability to balance the needs of the present *without* compromising the ability of future generations to meet their own needs.
- Sustainability involves:

✓ Conserving resources: Using resources like energy, raw materials, habitats, and human labor in a way that allows them to be maintained over time.

✓ Climate protection: Reducing greenhouse gas emissions and using renewable energy sources.

✓ Considering the three elements of ESG (Environmental, Social, and Governance) and bringing these three aspects into balance.

Is Natural Rubber Sustainable?

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Natural Rubber Can be Sustainable…

- ☺ …*if* it's sourced and managed responsibly. Sustainable natural rubber…
- ☺ Can be produced without clearing forests
- ☺ Can increase biodiversity and carbon sequestration
- ☺ Can reduce carbon dioxide emissions from deforestation
- ☺ Can avoid human and labor rights violations

Unsustainable Natural Rubber:

- ☹ Contributes to deforestation,
- ☹ Contributes to biodiversity loss
- ☹ Contributes to pollution
- ☹ Can lead to human rights abuses
- ☹ Can lead to land grabs by governments and corporations.

Let’s Look at Some Real-Life Statistics:

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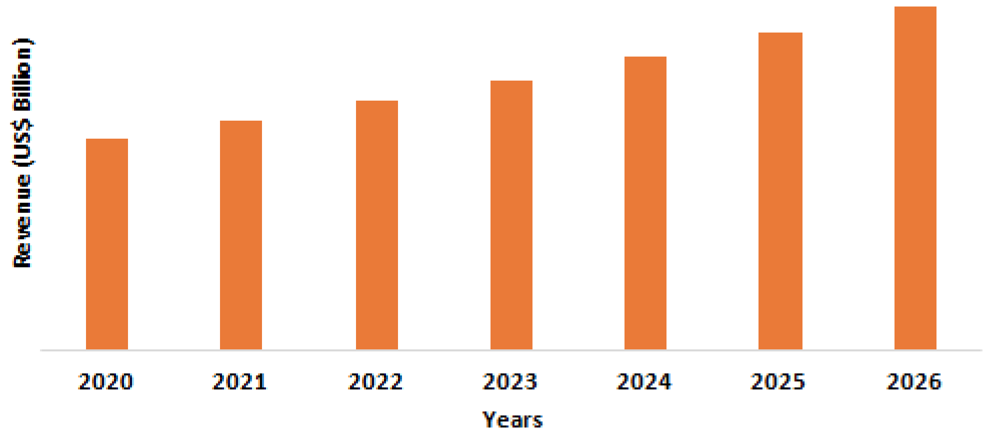
Natural Rubber Imports.

- In 2024, United States imported $47.8M of Natural Rubber latex. In 2024, the main origins of United States' Natural Rubber latex imports were: Guatemala ($15.6M), Thailand ($13.1M), Vietnam ($12.2M), Cameroon ($3.29M), and Sri Lanka ($2.03M).
- While specific data on natural rubber usage within the adhesives industry is difficult to obtain, adhesives are a major end-use sector for rubber, and the adhesives market is growing, suggesting increased demand for rubber.
- The US Rubber-Based Pressure Sensitive Adhesive Market size is estimated to reach 3.7 Billion by 2030, growing at a CAGR of 4.70% during the forecast period 2024-2030.



https://www.industryarc.com/Research/Rubber-based-Pressure-Sensitive-Adhesive-Market-Research-502981

SPOTT (Sustainability Policy Transparency Toolkit) March 2024 Assessment Summary for Natural Rubber:

https://www.spott.org/natural-rubber-assessment-summary/

Issues Facing Rubber Sustainability

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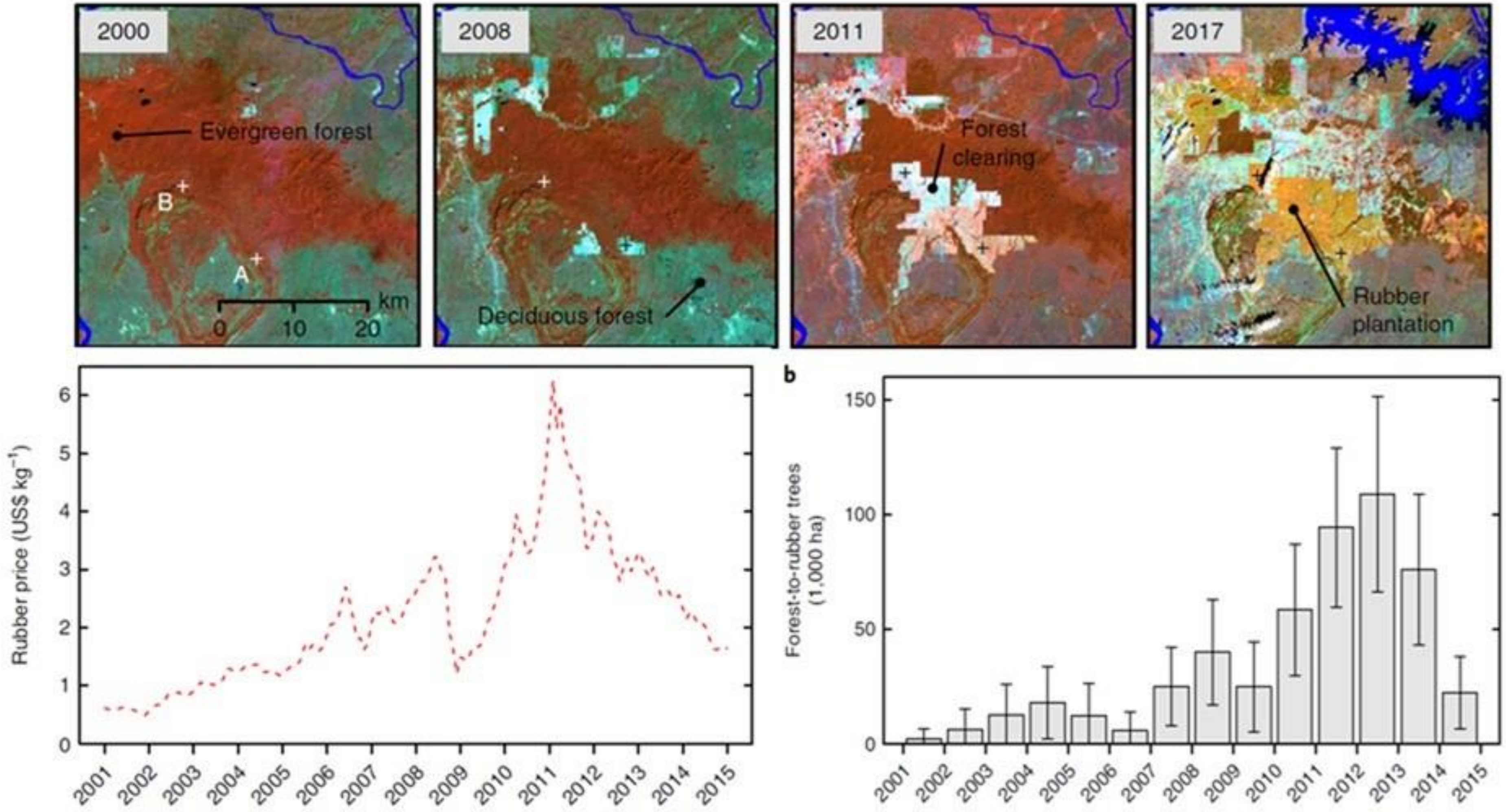
Some Issues Facing Rubber Sustainability:

- ☹ Deforestation and Loss of Biodiversity
- ☹ Water Usage/Wastewater Pollution
- ☹ Global Warming/Climate Change
- ☹ Growing Rubber Outside its Natural Range
- ☹ South American Leaf Blight and Other Diseases
- ☹ Chemical/Herbicide Exposure
- ☹ Competition with Palm Oil
- ☹ Volatility in the Rubber Supply Chain

Deforestation and Loss of Biodiversity

- Replacing diverse forests with monoculture rubber plantations drastically reduces the habitat available for various wildlife, leading to species loss.
- To establish rubber plantations, large swaths of forest are cleared, often in regions with high biodiversity. This loss of diverse flora and fauna can disrupt the delicate balance of ecosystems, affecting food chains and nutrient cycles.
- Recent research suggests that the amount of deforestation caused by rubber production is significantly higher than previously estimated, with satellite imagery revealing extensive forest loss linked to rubber plantations.
- The opacity of the rubber supply chain makes it difficult to trace the source of rubber and identify areas where deforestation is occurring.

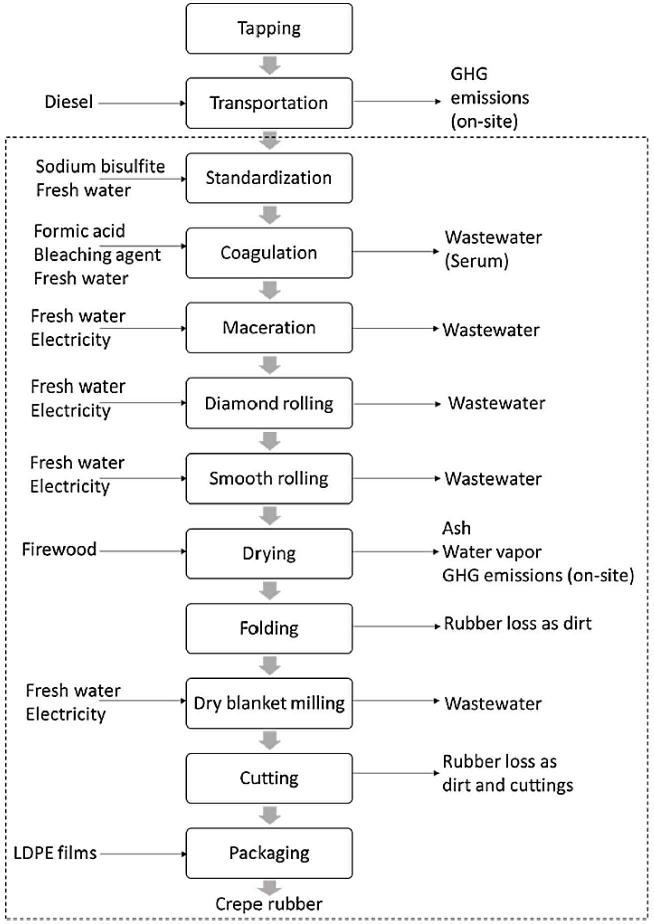
Example: Deforestation in Cambodia



Grogan, K., Pflugmacher, D., Hostert, P. *et al.* (2018). "Unravelling the link between global rubber price and tropical deforestation in Cambodia." *Nature Plants* **5,** *47–53.*

Water Usage/Wastewater Pollution

- Rubber production generates substantial wastewater containing chemicals such as ammonia, heavy metals, high acidity, high suspended solids, latex residues, and organic compounds, including proteins, lipids, and carbohydrates, which can lead to high levels of BOD and COD.



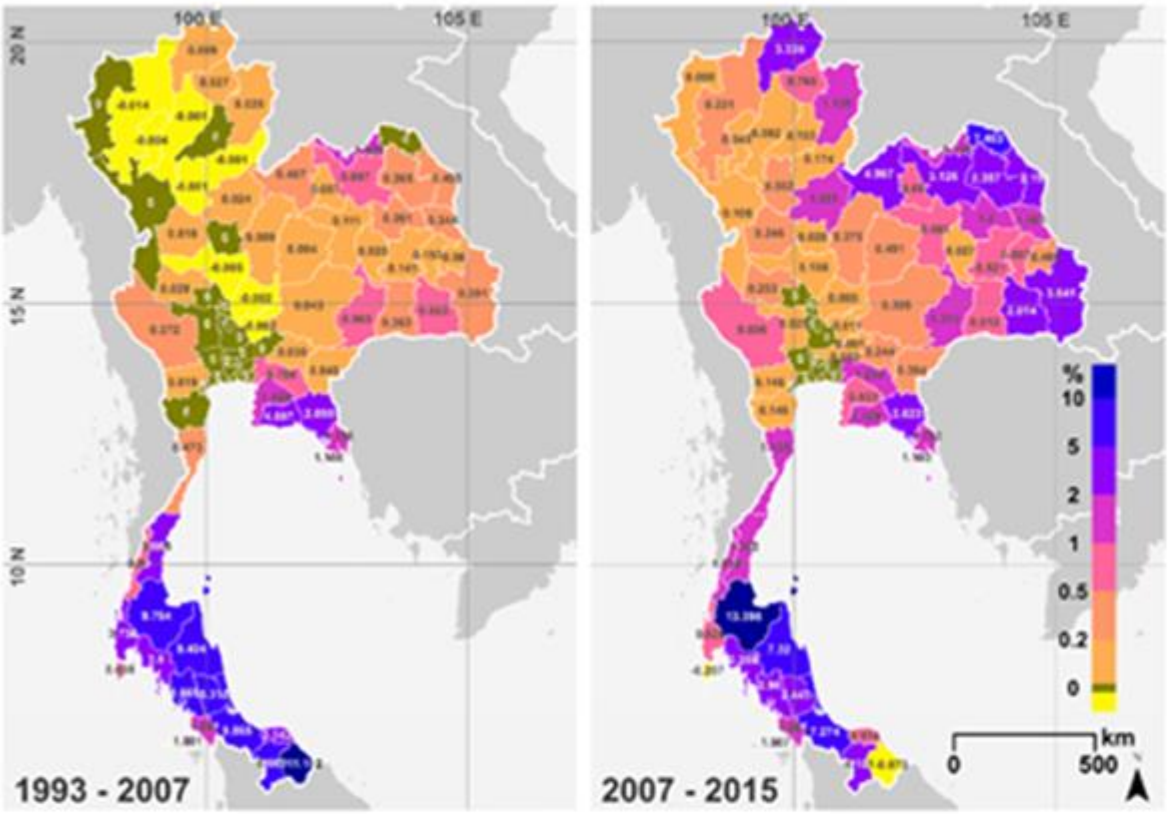
Dunuwila, P., Rodrigo, V. H. L., & Goto, N. (2018). “Sustainability of natural rubber processing can be improved: A case study with crepe rubber manufacturing in Sri Lanka.” *Resources, Conservation and Recycling, 133, 417–427.*

Water Usage/Wastewater Pollution

- ☹ Runoff from crepe and RSS (Ribbed Smoked Sheet) rubber production can significantly harm aquatic life. When these pollutants enter water bodies, they can lead to:
- ☹ Oxygen depletion: Organic matter in the wastewater consumes dissolved oxygen during decomposition, leaving insufficient oxygen for aquatic organisms.
- ☹ Toxicity: Chemicals in the runoff can be toxic to fish, invertebrates, and other aquatic species.
- ☹ Eutrophication: Nutrient-rich wastewater can promote excessive algae growth, which blocks sunlight and disrupts aquatic ecosystems.
- ☹ Habitat destruction: Sediments and pollutants can alter the physical environment, making it unsuitable for many species.

Global Warming/Climate Change

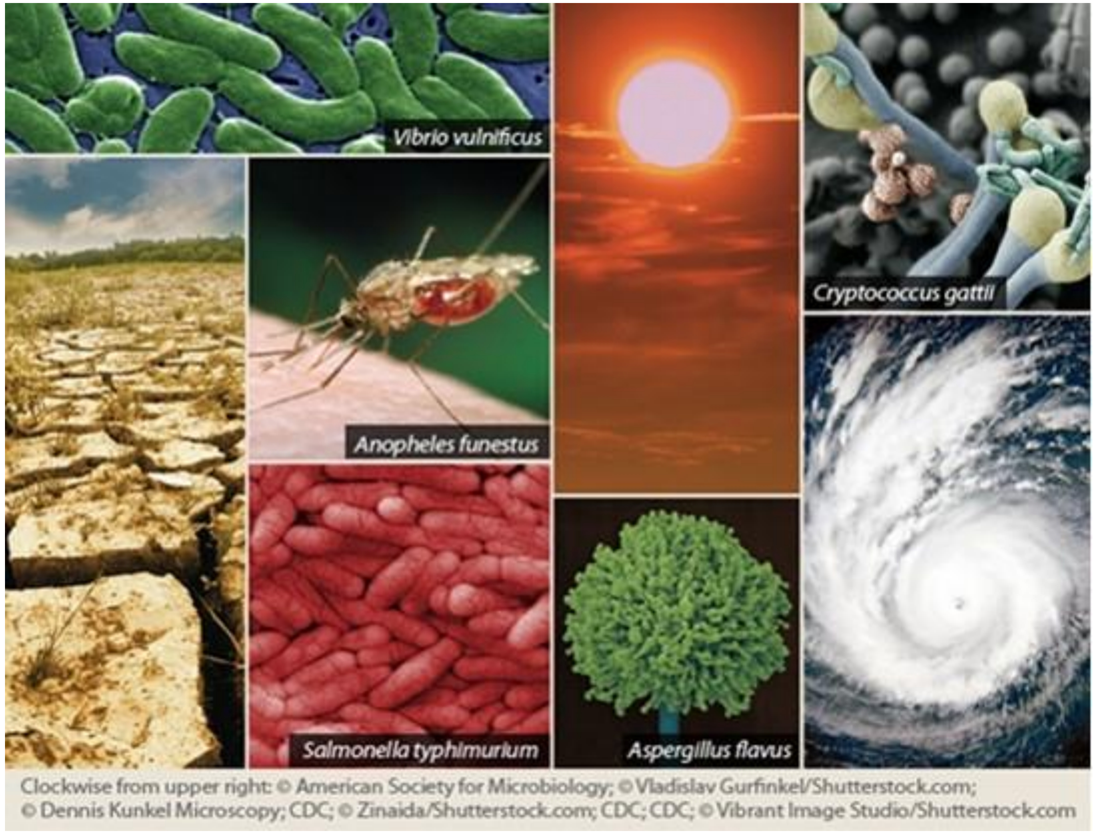
- Global warming presents significant challenges to rubber production, including potential declines in natural rubber yields due to changing temperatures and weather patterns, as well as increased risks from pests and diseases.
- Climate change could necessitate shifts in the geographic areas suitable for rubber cultivation leading to new deforestation and pollution.



Golbon, R., Cotter, M., and Sauerborn, J. (2018). “Climate change impact assessment on the potential rubber cultivating area in the Greater Mekong Subregion” *Environ. Res. Lett. 13*

Climate Change and Rainfall Patterns

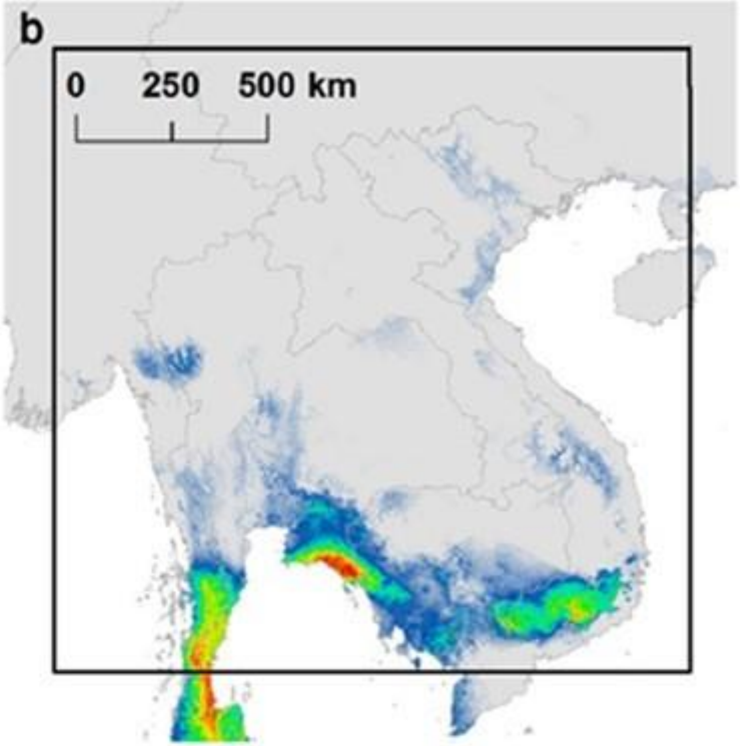
- Higher temperatures and irregular rainfall can affect turgor pressure (pressure within the latex vessels) and latex yield, with drought periods potentially causing further stress on the trees.
- Warmer temperatures may favor the spread of diseases and pests that can damage rubber trees and reduce latex production.
- Changing weather patterns may alter the timing of rubber tree growth and flowering, impacting latex harvesting schedules.

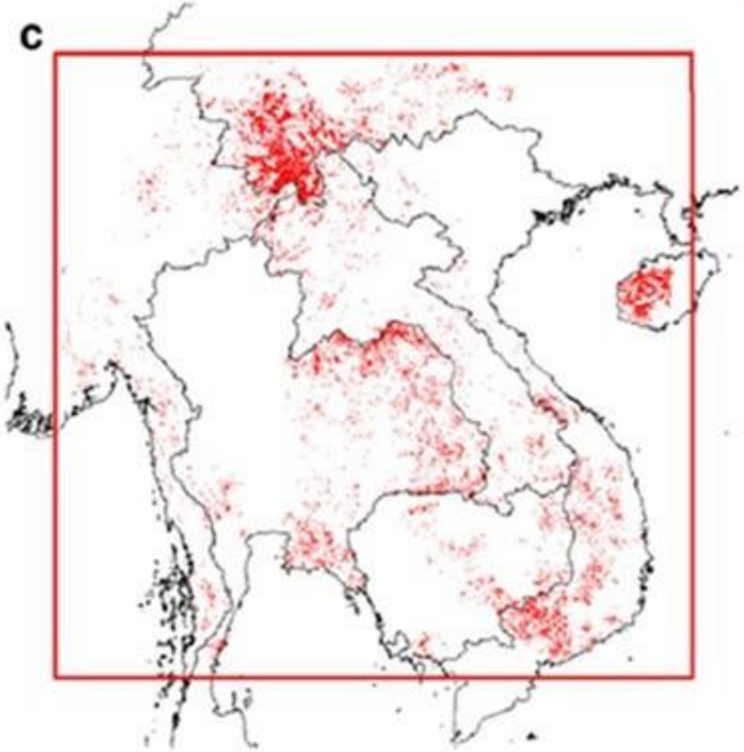


Cooney, C. M. (2011). "Climate change and infectious disease: Is the future here?." *Environmental Health Perspectives, 119 (9), a394 - a397.*

Growing Rubber Outside its Natural Range

- Natural rubber is increasing grown outside its natural range resulting in deforestation and loss of biodiversity.

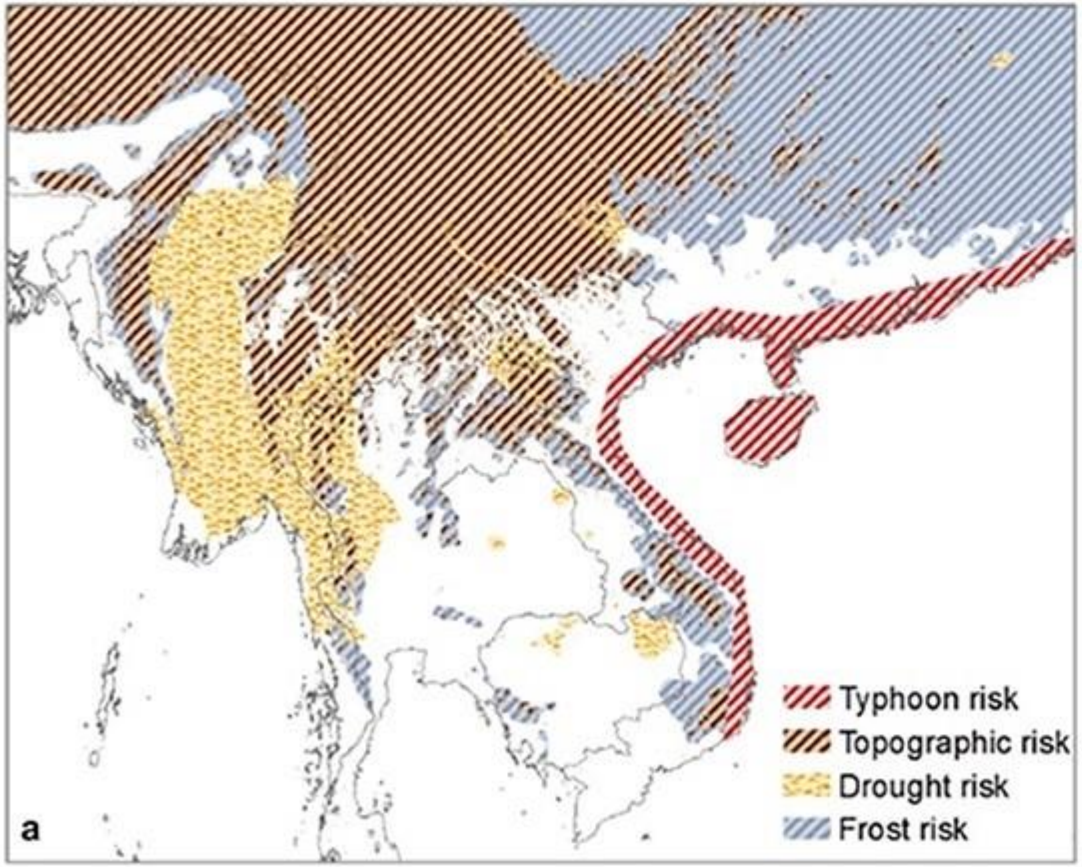




Ahrends, A., et al., (2015). “Current trends of rubber plantation expansion may threaten biodiversity and livelihoods.” *Global Environmental Change, 34, 48–58.*

Growing Rubber Outside its Natural Range

- By shifting natural rubber plantations to northern and mountainous regions, rubber plants or subjected to increased risks of drought, frost, and high winds.
- Expansion into marginal areas trades high-biodiversity land for unsustainable plantations that are poorly adapted to local conditions and compromise livelihoods when rubber prices fall.



Ahrends, A., et al. (2015). “Current trends of rubber plantation expansion may threaten biodiversity and livelihoods.” *Global Environmental Change, 34, 48–58.*

SALB and Other Fungal Diseases

- Monoculture, climate change and rubber expansion has led to major losses worldwide due to fungal diseases. Severe leaf drop causes a drop in latex production and eventual tree death. Major diseases of *Hevea brasiliensis* include:

➢ South American Leaf Blight (*Microcyclus ulei)*

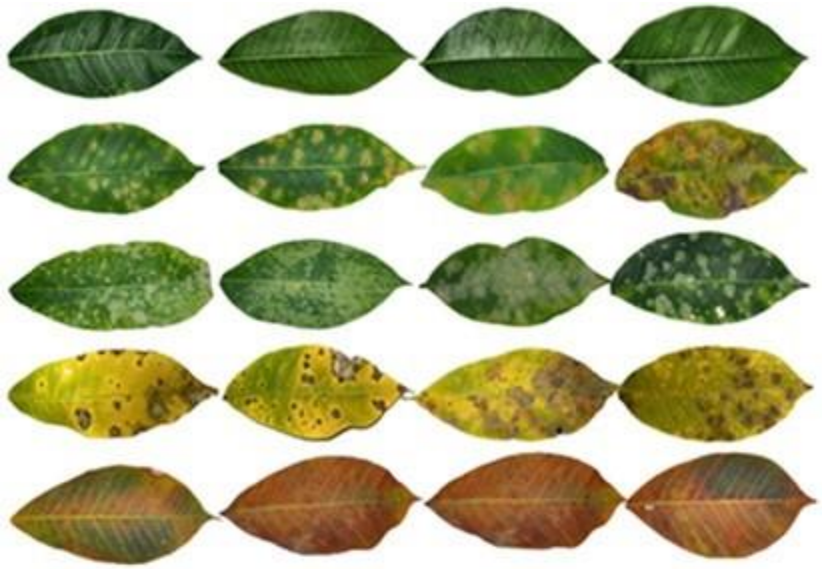
➢ Powdery Mildew (*Oidium heveae)*.

➢ Phytophthora Leaf Fall/Abnormal Leaf Fall (*Phytophthora* spp.)

➢ Pestalotiopsis Leaf Fall Disease (*Pestalotiopsis spp.)*

➢ Colletotrichum Leaf Disease (CLD)/Anthracnose (*Colletotrichum* spp.)

➢ White Root Rot (*Rigidoporus microporus*)



Zeng, T., Li, C., Zhang, B., Wang, R., Fu, W., Wang, J., & Zhang, X. (2022). Rubber leaf disease recognition based on improved deep convolutional neural networks with a cross-scale attention mechanism. *Frontiers in Plant Science*, *13*, 829479.

Chemical/Herbicide Exposure

- ☹ One of the reasons *Hevea brasiliensis* trees are so susceptible to disease is that they have a limited genetic diversity.
- ☹ Herbicides, pesticides and anti-fungal compounds are used in large quantities to keep the trees alive and producing.
- ☹ In addition, chemicals like ammonia are necessary to preserve latex during the collection process.
- ☹ Workers, in particular smallholders, may or may not be aware of the dangers of exposure to these chemicals or have access to PPE.
- ☹ Run-off and soil contamination are also inevitable due to the large quantities used and lack of oversight in their use.

Competition with Palm Oil

- 85% of rubber production is by smallholder farmers. These smallholders are increasing turning to oil palm cultivation. Palm oil has several advantages over rubber to smallholders:

➢ Higher Profitability

➢ Reduced Labor Requirements

➢ Increased Demand for Palm Oil

➢ Efficiency and Productive Land Use

➢ Government Incentives

➢ Easier Establishment

Schwarze, Stefan et al. (2015). "Rubber vs. oil palm: an analysis of factors influencing smallholders' crop choice in Jambi, Indonesia." , *EFForTS Discussion Paper Series, No. 11, GOEDOC*

	Change in area (%)		
	1992-2002	2002-2012	1992-2012
Oilpalm	362	149	1050
Plantation rubber	9	-3	6
Jungle rubber	-17	71	41
Fallow	5	4	9
Forest	-38	-40	-63
Paddy rice	-26	-28	-47
Other agriculture	504	30	686
No agricultural uses	33	26	67

Volatility in the Rubber Supply Chain

- During the Covid-19 pandemic, pressure sensitive tape producers learned the term *force majeure* the hard way as rubber supplies became constrained, borders closed, work stopped, and ships were held at ports. But even in the best of times the supply of rubber is volatile due to disease, weather and competition for the available supply.
- A company's Environmental, Social, and Governance (ESG) goals may be overlooked in order to get sufficient raw materials to meet their own production goals.
- Nor should the air and water pollution caused by shipping raw materials across the globe be ignored for a company with sustainability goals.

Toward a More Sustainable Natural Rubber

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What Can be Done to Reduce the Waste Associated with Rubber Production?

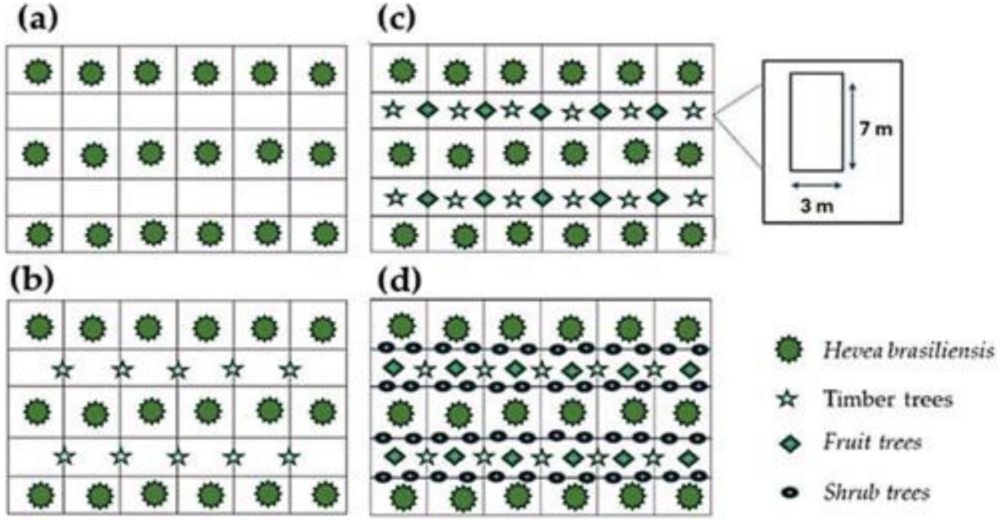
Improving Rubber Sustainability

- Reduce:
  - ➢ Intercropping among Rubber Trees
- Recycle:
  - ➢ Rubber Recycling/Recovery/Devulcanization
- Replace:
  - ➢ Guayule and Russian Dandelion
  - ➢ Polyisoprene/Bio-Based Isoprene
  - ➢ Bio-Based PHA as a Rubber Substitute
  - ➢ Genetically Modification of Natural Rubber
- Reuse:
  - ➢ Rubberwood and Rubber Seed

Reducing Land Waste: Rubber Intercropping

- Some of the advantages of rubber intercropping include:

➢ Improved Land Utilization
➢ Enhanced Soil Health
➢ Erosion Control
➢ Diversified Income for Smallholders
➢ Pest Control/Disease Management
➢ Improved Biodiversity
➢ Resistance to Weather Fluctuations
➢ Increased CO2 Sequestering



Buakong, W., Suwanmanee, P., Ruttajorn, K., Asawatreratanakul, K., & Leake, J. E. (2024). “Sustainable rubber production intercrop with Mixed fruits to improve physiological factors, productivity, and income.” *ASEAN Journal of Scientific and Technological Reports*, *27(6), e254945-e254945.*

Recycle: Rubber Recycling – More Than Just Garden Planters

Recycle: Rubber Recovery

- Rubber recovered from used tires can be recycled. Some primary recycling techniques include:

➢ Shredding and chipping into crumb rubber: Crumb rubber can be used a mulch, made into rubberized mats for flooring and turf, combined with asphalt for pavements, and blended back into new tires.

➢ Devulcanizing back into poly(isoprene): This recycled poly(isoprene) can then be blended back into virgin rubber.

➢ Pyrolyzing used tires: Industrial pyrolysis of crumb rubber can be used to create industrial grade isoprene and limonene.

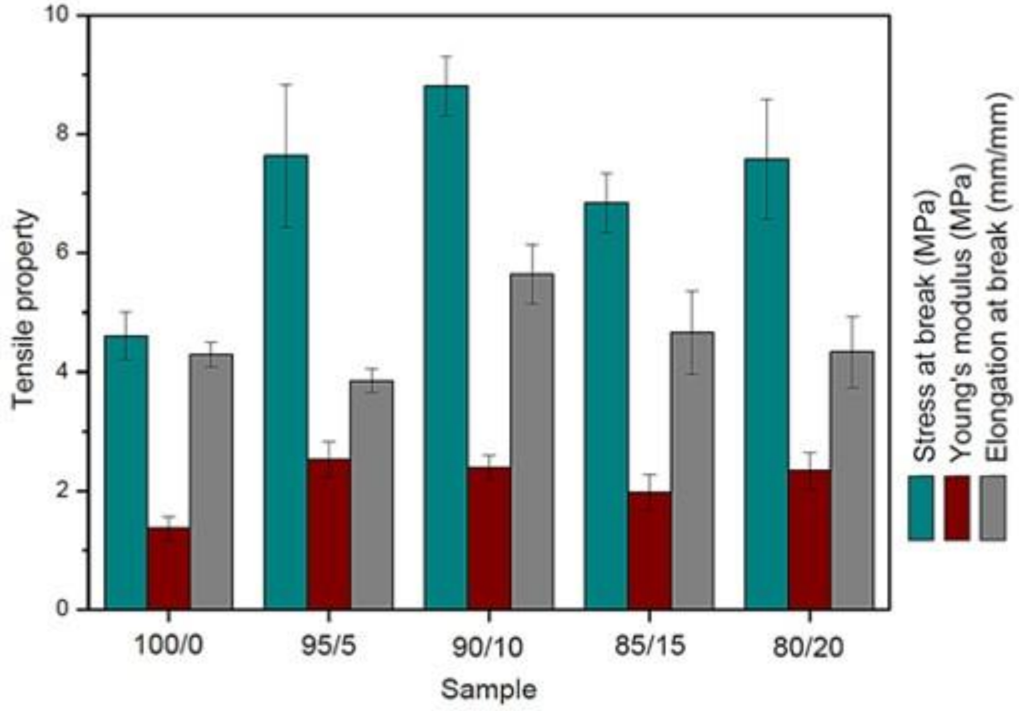
Recycling Tires: Crumb Rubber

- Crumb rubber is made of recycled tires that are cleaned, ground into smaller pieces and screened to obtain uniform sizes.
- Depending on the grinding and screening procedure, crumbs cand range from particles so tiny they resemble dust to pieces as large as one-half inch.

Al-Fakih, A., Mohammed, B. S., & Liew, M. S. (2020). "Tires rubber as a useable material in civil engineering applications: An overview." *International Journal of Advanced Research in Engineering and Technology (IJARET), 11(11), 315–325.*

Recycle: Blending Crumb Rubber with NR

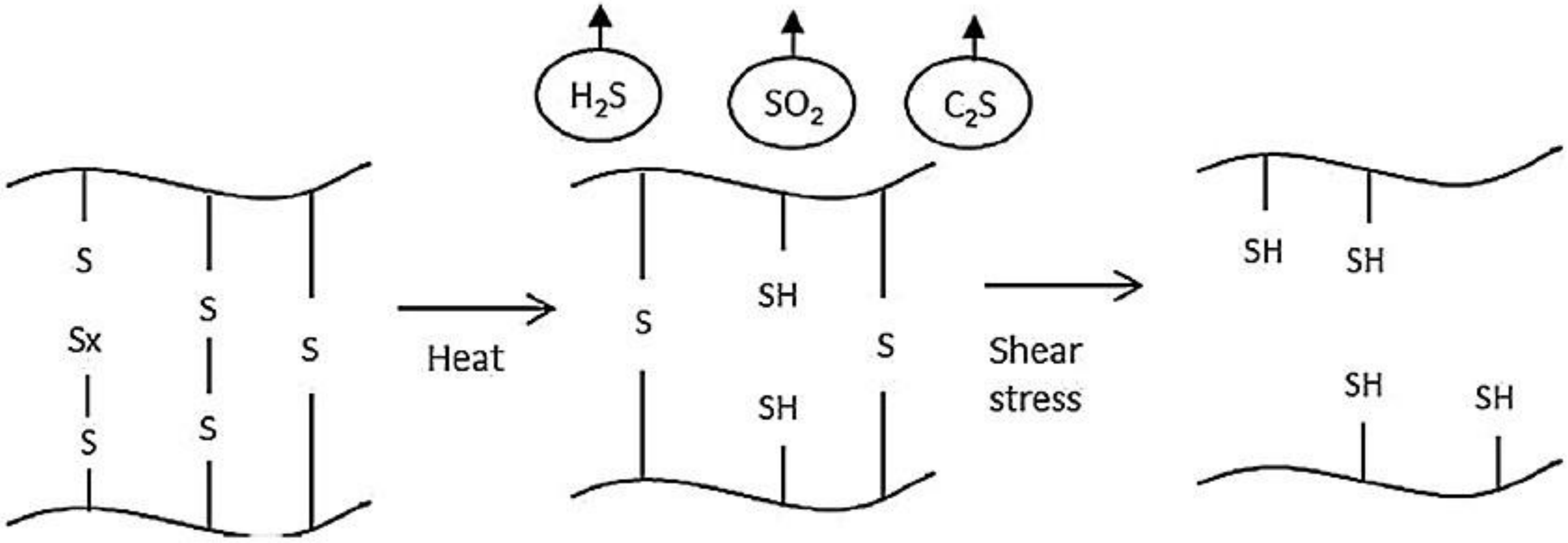
- Blending crumb rubber with natural rubber can reduce the overall cost of the final product.
- Recycling tires into crumb rubber helps reduce waste and environmental burden.
- Depending on the ratio and processing, the addition of crumb rubber can enhance mechanical properties like impact resistance and energy absorption.



De Sousa, F., & Zanchet, A. (2018). “In the Search for Sustainable Processing in Compounds Containing Recycled Natural Rubber: The Role of the Reversion Process.” *Recycling, 3(4), 47, 17 pages.*

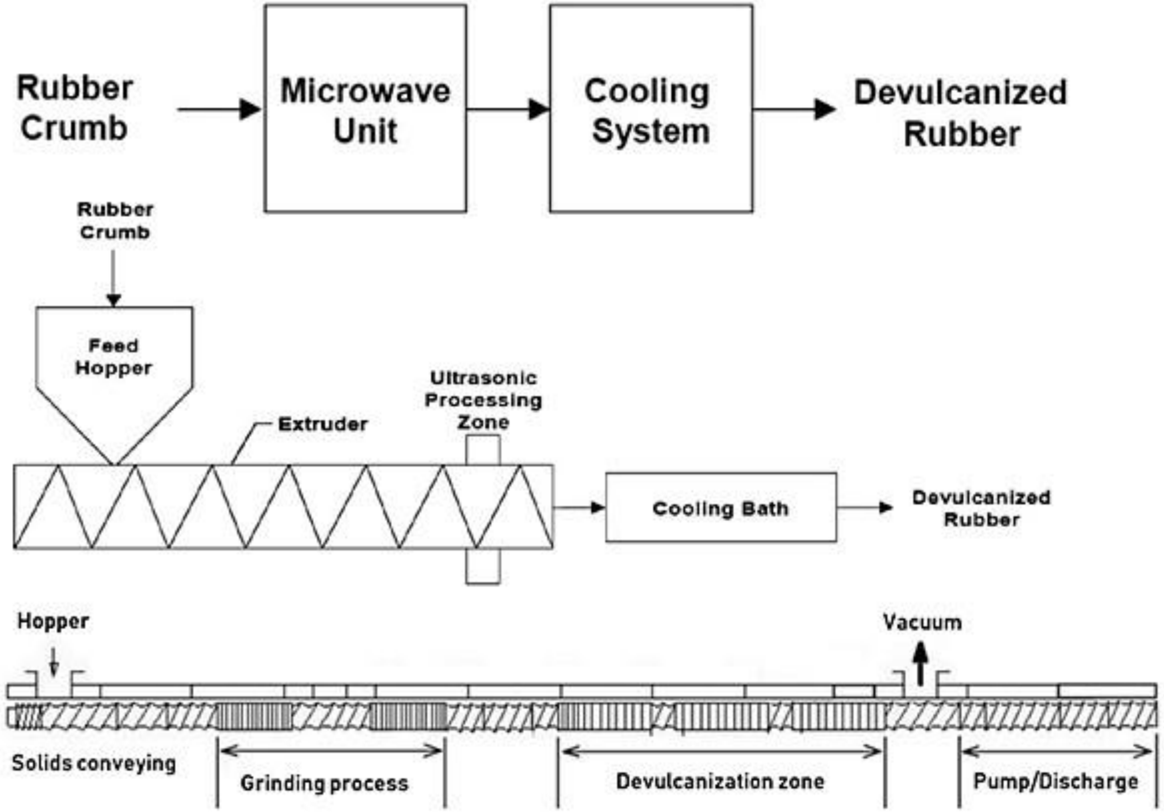
Reuse: Rubber Devulcanization

- Crosslinked rubber can be devulcanized using heat and shear stress:



Markl, E. & Lackner. M. (2020) “Devulcanization Technologies for Recycling of Tire-Derived Rubber: A Review.” *Materials, 13, 1246, 16 pages.*

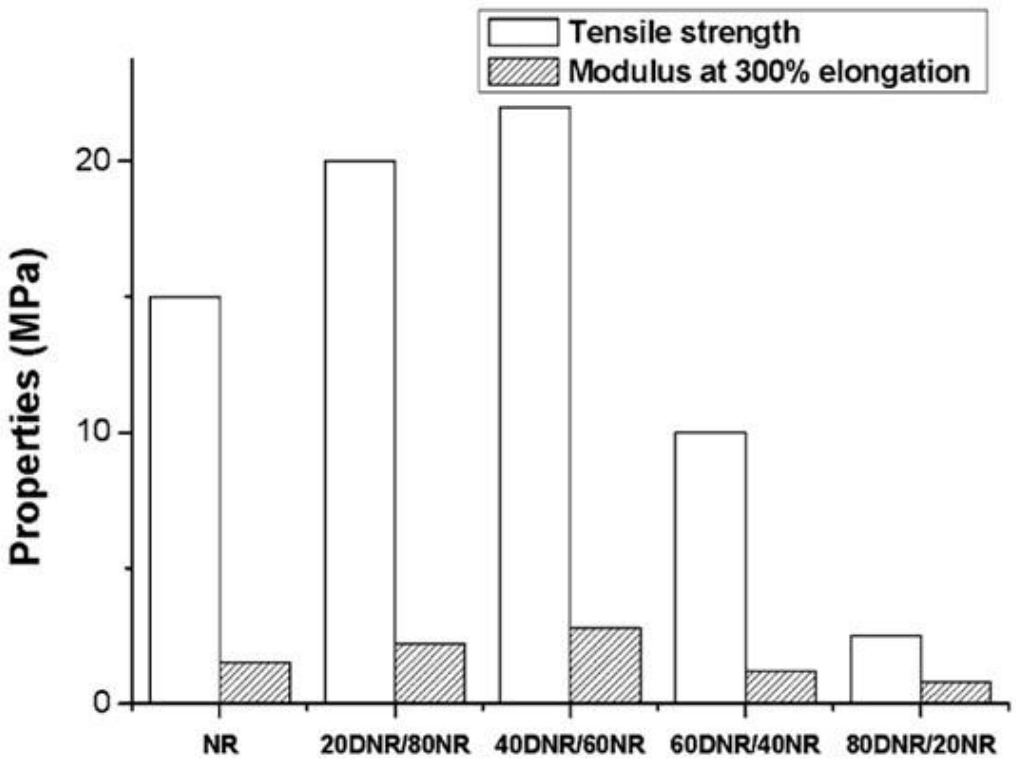
Reuse: Rubber Devulcanization



Myhre, M., Saiwari, S., Dierkes, W., & Noordermeer, J. (2012). "Rubber Recycling: Chemistry, Processing, and Applications." *Rubber Chemistry and Technology, 85(3), 408–449.*

Reuse: Rubber Devulcanization

- Devulcanized rubber can then be blended with virgin rubber.

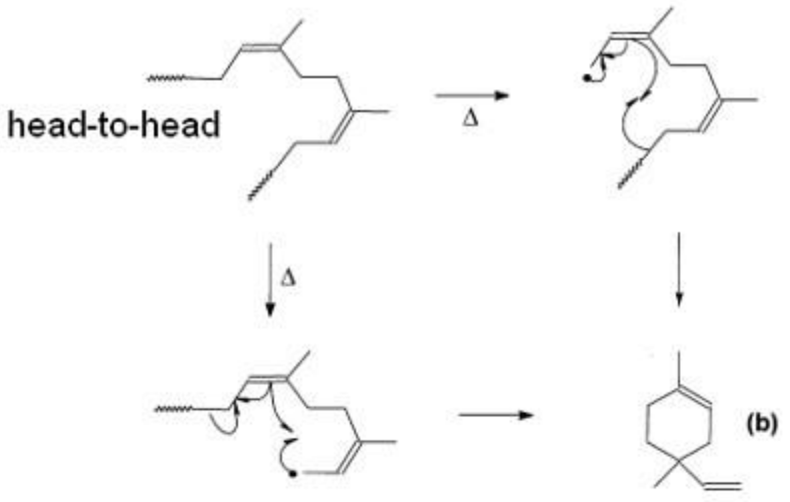


Mechanical properties as a function of DNR content

Rooj, S., Basak, G. C., Maji, P. K., & Bhowmick, A. K. (2011). "New Route for Devulcanization of Natural Rubber and the Properties of Devulcanized Rubber." *Journal of Polymers and the Environment, 19(2), 382–390.*

Reuse: Pyrolyzing Used Tires

- When tires are heated under controlled conditions in a pyrolysis reactor, the polyisoprene chains break down, releasing isoprene as a primary product, which can then further react to form limonene through dimerization.

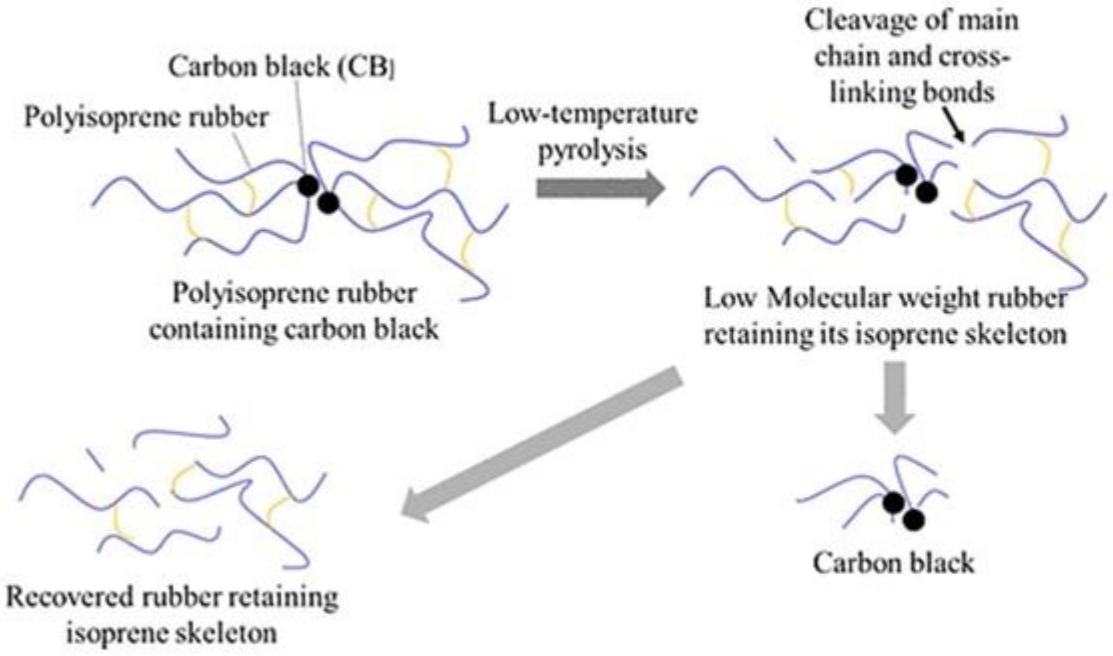


Production mechanism of 1,4-dimethyl-4-vinylcyclohexene by pyrolysis of natural rubber.

Choi, Sung-Seen (1999), "Correlation of Crosslink Density with Pyrolysis Pattern of Natural Rubber Vulcanizates with Efficient Vulcanizing Cure System," *Journal of Analytical and Applied Pyrolysis,* Vol. 52, pp. 105-112.

Reuse: Pyrolyzing Used Tires

- Isoprene can be used in the production of synthetic poly(isoprene) while
- Limonene can be used in the fragrance industry, cleaning products, and as an industrial solvent.
- The carbon black used in the tires can also be recovered from the pyrolysis procedure.



Awosu, E., et al. (2025). "Pyrolysis Characteristics of Tire Rubber at Low Temperatures." *ACS Omega, 10, 8119–8126.*

Replace: Guayule and Russian Dandelion

Guayule

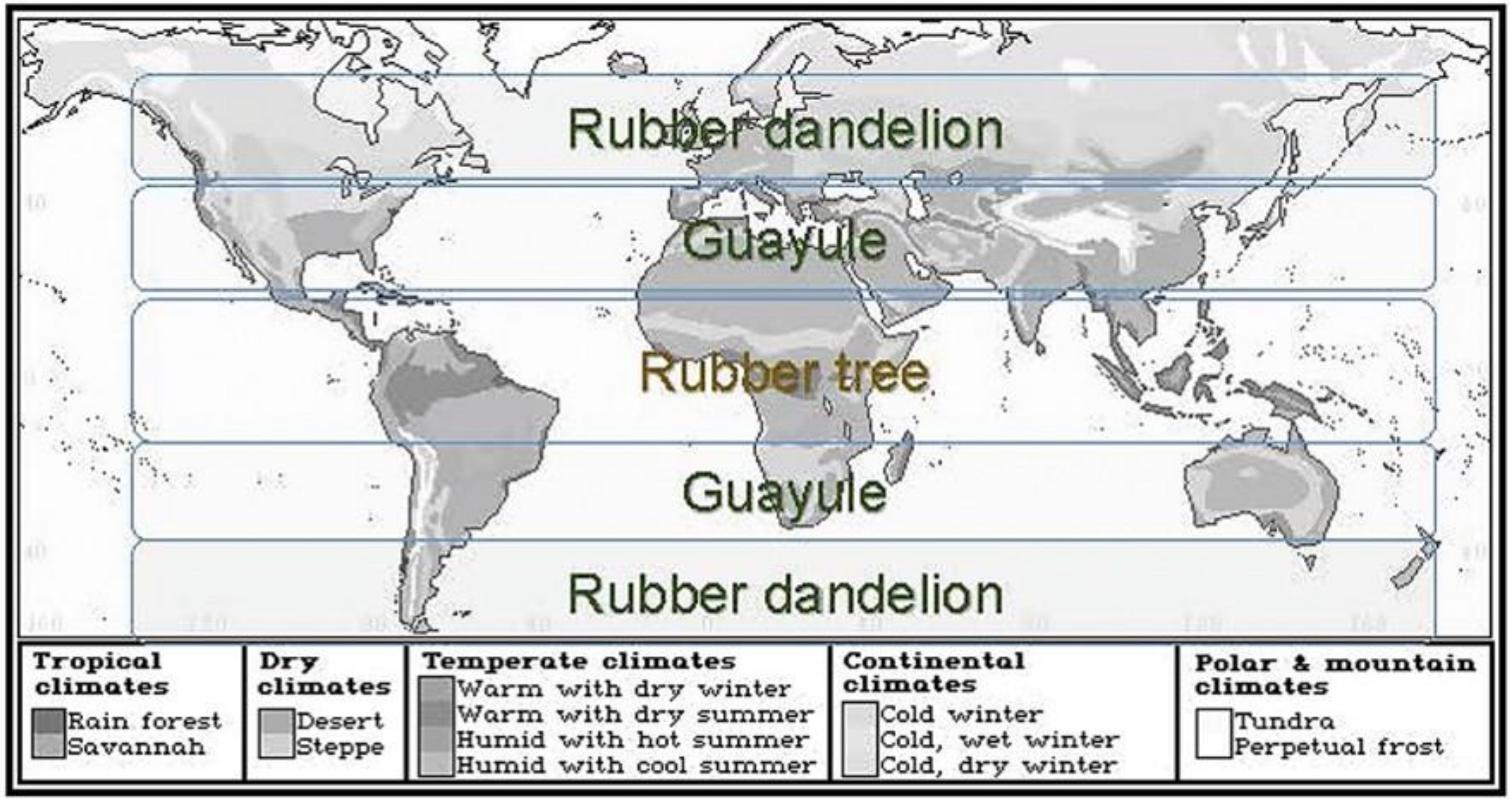
Russian/Rubber Dandelion

Replace: Guayule and Russian Dandelion

- **Guayule (*Parthenium argentatum*)** – is a perennial woody shrub native to the southwestern United States and northern Mexico. Guayule is already being commercially produced, primarily for tire production and to make allergen-free latex gloves.
- **Russian/Rubber Dandelion (*Taraxacum kok-saghyz*)** – is a species of dandelion native to Kazakhstan known for its high-quality latex. Unlike guayule, Russian dandelion prefers a cooler wetter environment, making cultivation in the northern US and Canada a possibility. Continental Tire has produced experimental truck tires and commercial bicycle tires from *Taraxacum* latex.

https://www.continental-tires.com/about/sustainability/activities-and-initiatives/design-and-sourcing/taraxagum/

Growing Range for Rubber/Rubber-Like Plants



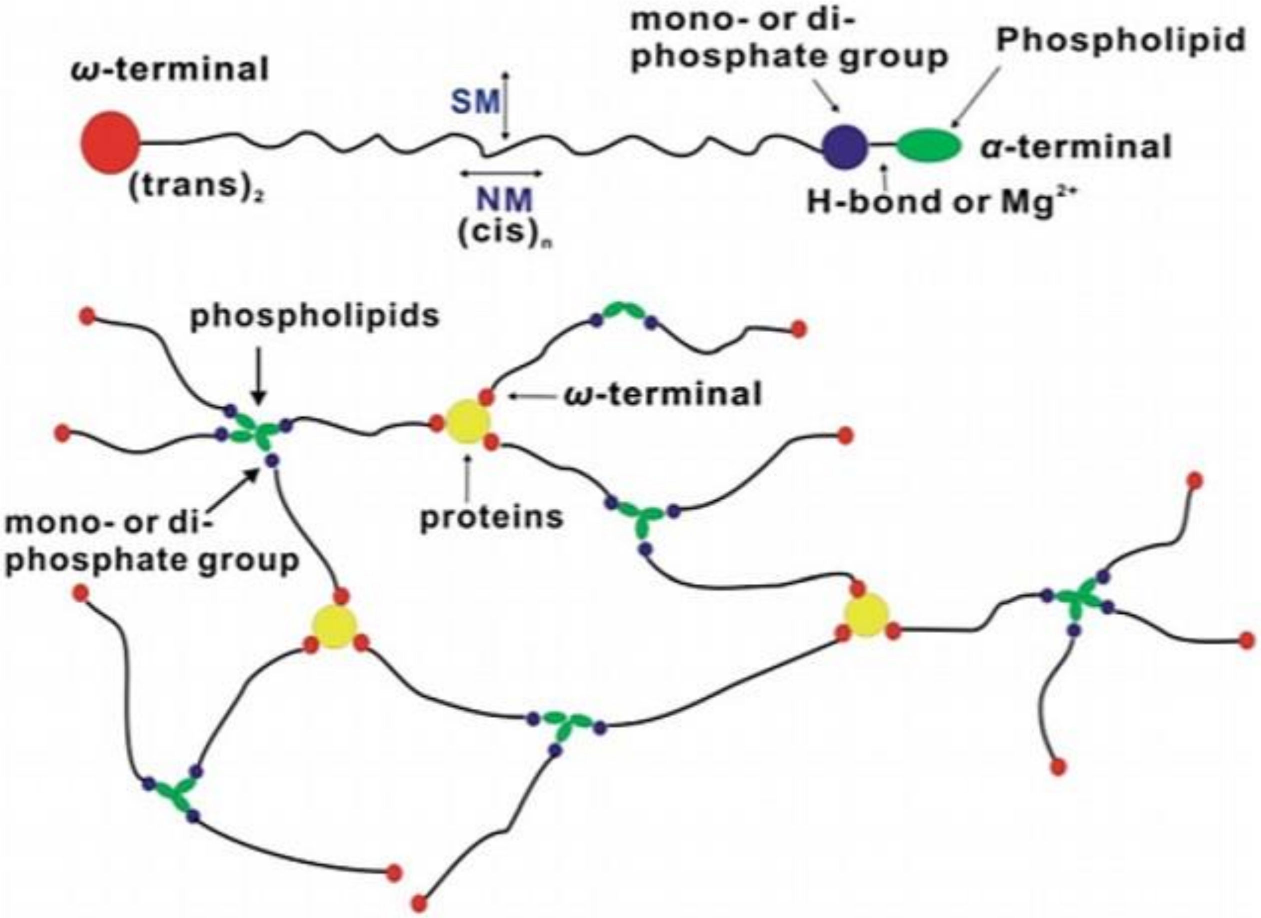
Cornish, K. (2017). "Alternative Natural Rubber Crops: Why Should We Care?" *Technology & Innovation, 18(4), 244–255.*

Properties for Rubber/Rubber-Like Plants

	Rubber tree	Rubber dandelion	Guayule
Molecular weight	High	High	High
Branching	Yes	Yes	No
Gel	Yes	Yes	No
Protein	High	High	Low
Allergenic protein	Yes	Yes	No
Fatty Acid	Low	Low	High
Tensile Strength	High	High	High
Modulus	High	High	Low
Elongation	Medium	Medium	High

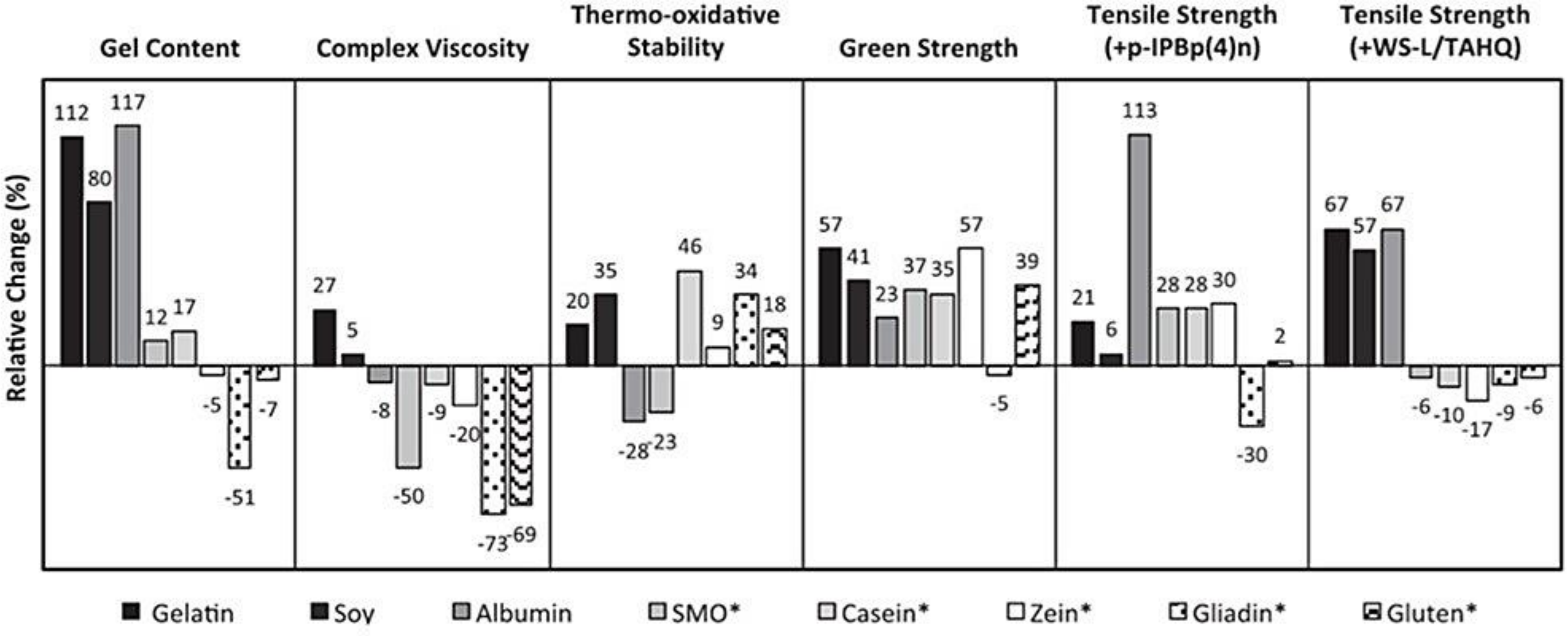
Cornish, K. (2017). "Alternative Natural Rubber Crops: Why Should We Care?" *Technology & Innovation, 18(4), 244–255.*

Mechanism of Gel Formation



Liu, J., Wu, S., Tang, Z., Lin, T., Guo, B., & Huang, G. (2015). *New evidence disclosed for networking in natural rubber by dielectric relaxation spectroscopy. Soft Matter, 11(11), 2290–2299.*

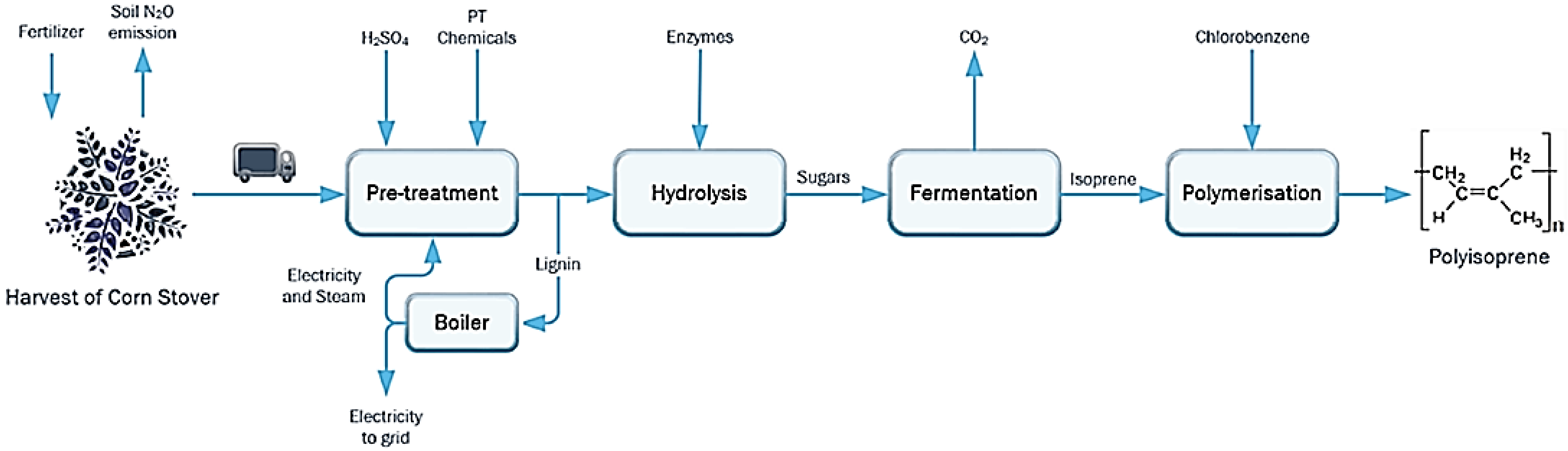
Guayule Properties are Improved with the Addition of Protein



Lhamo, D., & McMahan, C. (2017). *EFFECT OF PROTEIN ADDITION ON PROPERTIES OF GUAYULE NATURAL RUBBER. Rubber Chemistry and Technology, 90(2), 387–404.*

Replace: Polyisoprene/Bio-Based Isoprene

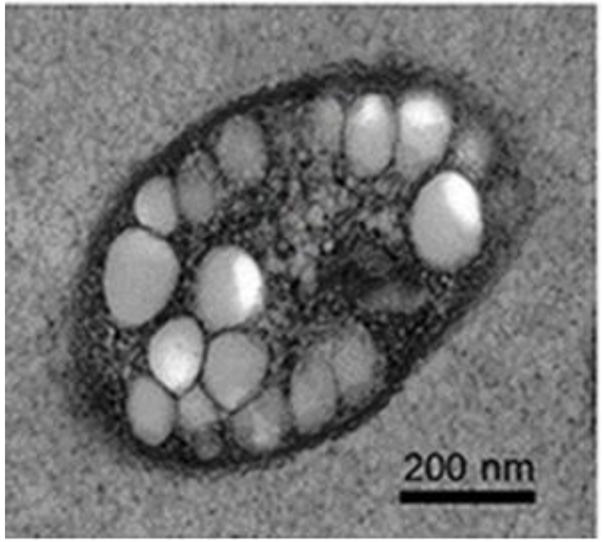
- While polyisoprene is typically produced from petroleum-based isoprene, polyisoprene can also be produced from the polymerization of a bio-based isoprene monomer. Bio-based isoprene monomer is produced from the fermentation of agricultural wastes like corn stover into glucose.



Batten, R., Karanjikar, M., and Spatari, S. (2021). "Bio-Based Polyisoprene Can Mitigate Climate Change and Deforestation in Expanding Rubber Production." *Fermentation, 7, 204, 14 pages.*

Replace: PHA as a Rubber Substitute

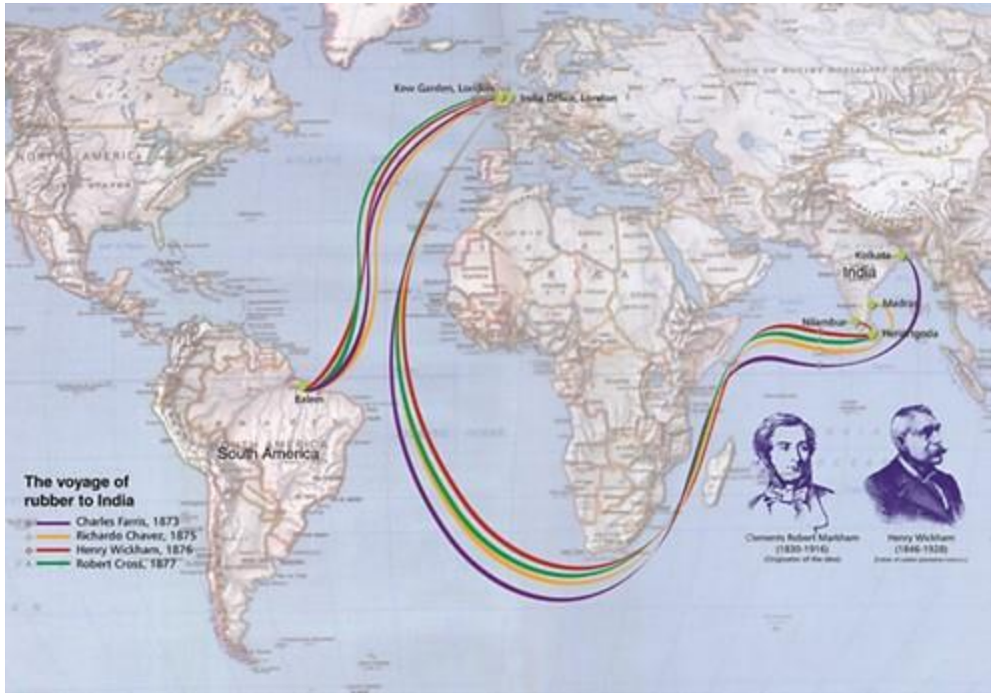
- Polyhydroxyalkanoates (PHAs) are polyesters produced in nature by numerous microorganisms, through bacterial fermentation of sugars or lipids. When produced by bacteria they serve as both a source of energy and as a carbon store.
- In the industrial production of PHA, the polyester is extracted and purified from the bacteria by optimizing the conditions of microbial fermentation of sugar, glucose, or vegetable oil.
- PHAs are biodegradable, biocompatible, and don't pollute the environment like conventional plastics. However, they are more expensive to produce than other plastics.
- PHAs can be used as a base polymer for biodegradable adhesives because of their elasticity, flexibility, and processability. The molecular structure of PHAs may need to be adjusted for adhesive applications.



https://lipidlibrary.aocs.org/chemistry/physics/microbial-lipid/polyhydroxyalkanoates

Replace: The Problem of Genetic Erosion

- The natural rubber (*Hevea brasiliensis*) currently grown in Asia and India was initially domesticated from a relatively small number of seeds, leading to a narrow genetic base.
- Breeding programs have focused on selecting trees for high yield and disease resistance, further reducing genetic diversity.
- The result is *Genetic Erosion*, or the loss of genetic diversity, which occurs when a population's genetic makeup becomes less varied over time.
- Entire plantations can be grown from a single *Hevea brasiliensis* variety, increasing the risk of vulnerability to diseases and environmental changes.



Priyadarshan, P. M. (2016). “Genetic Diversity and Erosion in *Hevea* rubber.” *In: Ahuja, M. R., and Mohan Jain, S. (eds), Genetic Diversity and Erosion in Plants: Case Histories, Springer, Chapter 6, 233–267.*

Replace: The Solution - GMO Natural Rubber

- The draft genome sequence of the *Hevea brasiliensis* was published on February 2, 2013.
- Since then, scientists have been working to genetically modify the rubber plant to improve:
  - Latex Yield
  - Drought Resistance
  - Disease Resistance
- Acceptance of GMO rubber among smallholders is still to be determined.

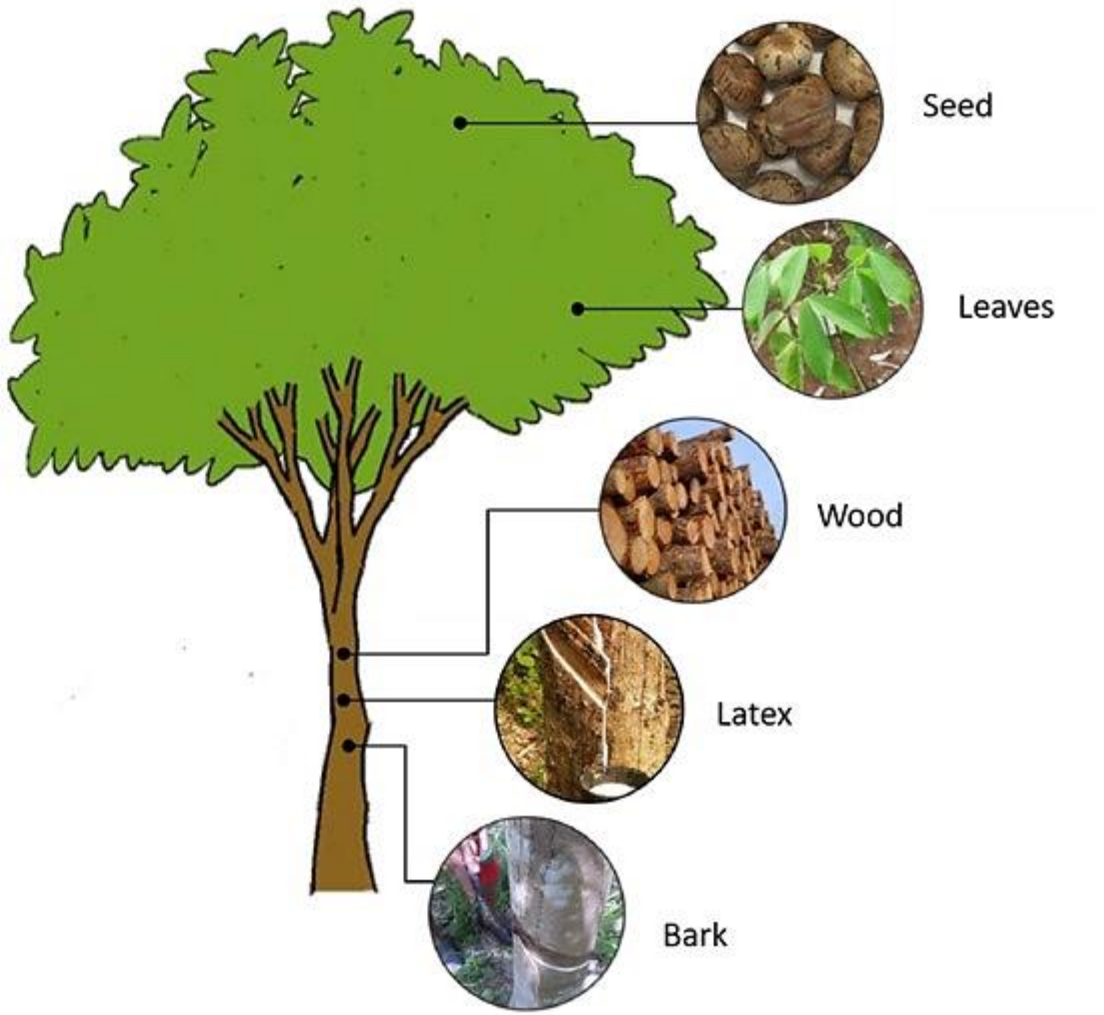
- In 2021, the Rubber Research Institute of India (RRII) planted the world's first GM rubber plant – developed to improve resilience to the northeast's climate – at their Sarutari research farm.

https://www.thehindu.com/news/national/other-states/first-ever-genetically-modified-rubber-planted-in-assam/article34901294.ece

Reuse: Applying the Circular Economy to Spent Rubber Trees.

- A circular economy takes a step forward from the traditional take-make-waste linear production cycle toward one that promotes products emphasizing resource reduction, extended use, reuse, and recycling while meeting performance, safety, and health requirements.
- Not unlike used tires, the rubber tree itself can generate significant waste, particularly once the latex has been ‘tapped-out’.
- New technologies are turning waste rubber trees into useful products.

The Rubber Tree: More than Just Latex



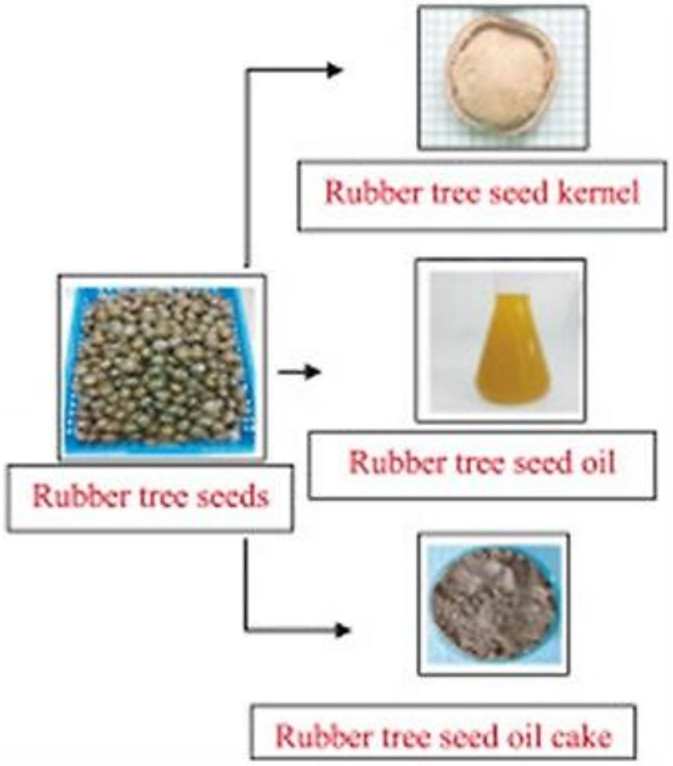
Widyarani, Coulen, S. C., Sanders, J. P., & Bruins, M. E. (2017). Valorisation of proteins from rubber tree. *Waste and Biomass Valorization*, *8*, 1027-1041.

Reuse: Rubberwood – All the Lumber, None of the Logging

- Rubberwood has many fine qualities that allow it to become more than just firewood once the latex is spent:
  - It is flexible, strong, and resistant to bacteria, fungus, and mold.
  - It's easy to work with, compatible with most industrial adhesives, and its beautiful grain makes it suitable for quality furniture.
  - Rubberwood sequesters CO_2. So long as the lumber – or the furniture made from it exists – the CO_2 remains trapped.
  - Rubberwood is considered a commercially sustainable source of lumber. Unlike some trees that are felled, rubber trees are always replanted.

Reuse: Rubber Seeds

- **Oil**
  - Rubber seed oil: Used in soap, cosmetics, mineral spray oil, and as a semidrying oil in paint
  - Biodiesel: A renewable, biodegradable, and non-toxic alternative to diesel fuel
- **Food**
  - Rubber seed meal: A protein supplement for livestock diets
  - Processed rubber seed: A staple food in some regions of Indonesia
- **Materials**
  - Rubber seed shell: Used in agroforestry, carbon sequestration, activated carbon, and soil erosion control.



Bhattacharjee, A., Bhowmik, M., Paul, C., Chowdhury, B. D., & Debnath, B. (2021). "Rubber tree seed utilization for green energy, revenue generation and sustainable development–A comprehensive review." *Industrial Crops and Products*, *174*, *114186*.

What Can the PSA Industry Do to Improve the ESG Impact of Natural Rubber?

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Environmental, Social, and Governance (ESG) and the True Cost of Natural Rubber

- Purchasing any raw material based on the lowest available cost can lead to the exploitation of smallholder labor, especially when market power is concentrated with large buyers.
- The true cost of natural rubber production extends beyond the price tag — encompassing environmental and social issues like deforestation, biodiversity loss, and labor rights.
- ESG demands a shift towards sustainable sourcing, eco-friendly practices, and transparent governance.
- Purchasers have an obligation to examine the transparency of their supply chains and ensure traceability so they can identify and address potential social and environmental risks.

Sustainable Sourcing

- **Prioritize certified rubber:** Look for certifications like the Forest Stewardship Council (FSC) and Rainforest Alliance, which ensure environmentally and socially responsible rubber production.
- **Trace the supply chain:** Implement measures to ensure transparency and traceability of rubber products, from the source to the final product, to verify sustainable practices.
- **Support ethical procurement suppliers:** Choose suppliers who adhere to ethical labor standards and sustainable practices and avoid those linked to deforestation or human rights abuses.
- **Promote sustainable farming practices:** Encourage and support rubber producers to adopt sustainable farming methods, such as mixed cropping, which can help preserve biodiversity and improve soil health.

Sustainable Manufacturing

- **Adopt green processing methods:** Implement technologies and processes that minimize environmental impact during manufacturing, such as using renewable energy and reducing water and solvent consumption.
- **Promote waste management and recycling:** Develop strategies for managing rubber waste and promoting recycling to reduce your environmental footprint.
- **Use renewable resources:** Explore the use of renewable resources and alternatives to traditional rubber production methods, such as synthetic rubber from biomass or blending natural rubber with recycled rubber.
- **Reduce the amount of natural rubber used:** Explore ways to reduce the amount of natural rubber used in production.

Collaboration and Engagement

- **Work with responsible partners:** Collaborate with other companies, NGOs, and civil society organizations to promote sustainable rubber practices.
- **Raise awareness:** Educate customers and stakeholders about the importance of sustainable rubber and the benefits of responsible sourcing.
- **Advocate for ESG policies:** Support policies and regulations that promote sustainable rubber production and reduce deforestation.
- **Support smallholders:** Work with companies that support smallholder rubber farmers to ensure their inclusion in sustainable supply chains and support their livelihoods.

Sustainable Rubber and Your Bottom Line

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Can You Afford to Buy Sustainable Rubber?:

- Balancing sustainability and competitive pricing can be difficult. Some questions to ask:

➢ If I buy certified natural rubber how much is my tape going to cost to manufacture?

➢ Is sustainable rubber available in the quantities I need for manufacturing?

➢ Can I market this tape at a price point that insures profit and a reasonable return on investment?

➢ How does the purchase of certified natural rubber fit with my company's stated sustainability goals?

Online Resources

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Programme for the Endorsement of Forest Certification (PEFC):

- Supporting Sustainable Rubber: https://cdn.pefc.org/rubber.pefc.org/media/2021-07/2f6879a6-d4e6-4c0c-a68f-925430d63769/1e0dc71e-0160-5d20-bf07-f90fa59ad8da.pdf
- Sustainable Rubber: How PEFC Connects New Supply With Growing Demand: https://cdn.pefc.org/rubber.pefc.org/media/2021-12/931d7623-bad8-44a9-ab2e-917f38d8e0d3/cbd0c218-997d-56ed-a885-563ea8c64146.pdf
- How PEFC certification can help the rubber industry to meet the ESG goals of a shifting global economy: https://rubber.pefc.org/news/how-pefc-certification-can-help-the-rubber-industry-to-meet-the-esg-goals-of-a-shifting-global-economy

Global Platform for Sustainable Natural Rubber (GPSNR)

- GPSNR Home Page: https://sustainablenaturalrubber.org/
- GPSNR: Desired State: https://rubberplatform.sharepoint.com/:b:/s/GPSNRMembers/EcpF65fI41BEgGDrB5quatEBcNrw3fNJknVplQ7XGDl5nQ?e=rsM9qy
- GPSNR Policy Framework: https://rubberplatform.sharepoint.com/:b:/s/GPSNRMembers/EWWVqZ4Ux-9Ag2L1tYjWaEcBE0lxBUDzpsSpHIT5bvWsVA?e=ixRPfh
- GPSNR: Statutes & Code of Conduct: https://sustainablenaturalrubber.org/gpsnr-statutes-code-of-conduct/
- Reports, Case Studies and Guidance Documents: https://sustainablenaturalrubber.org/reports/

Additional Resources

- Forest Stewardship Council (FSC): Provides certification for sustainably-sourced natural rubber: https://www.youtube.com/watch?v=meM4nqnE3K0
- International Rubber Study Group (IRSG): https://www.rubberstudy.org/welcome
- World Wildlife Fund: https://www.worldwildlife.org/projects/transforming-the-global-rubber-market
- Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF): https://forestsnews.cifor.org/tag/natural-rubber/
- The Sustainable Natural Rubber Initiative (SNR-i): https://www.rubberstudy.org/snr-i

Questions?

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