Seeds and Seedbeds: Two Venezuelan Initiatives for Science for Life

A group of farmers runs a potato-seed laboratory in Mucuchíes, in the Venezuelan state of Mérida, 3,600 metres above sea level. The Ministry of Science and Technology (Mincyt) describes this laboratory, the Biotechnology Centre for Training in Agamic Seed Production (Cebisa), as the most advanced of its kind in the country. In April 2025, the government formally handed over expanded training facilities to Cebisa, which has operated since 2009.[1]

A few weeks later, on 2 May, more than 250 children and young people from ten municipalities in Zulia presented 100 robotics projects designed to solve problems in their local communities.[2]

Initiatives of this kind exist in other Global South countries. What sets these apart is their context: the Venezuelan state has incorporated them into a national project, and that project stems from a question posed by Hugo Chávez: what is the purpose of each technology?[3]

For Chávez, that question could not be answered within the confines of laboratories. A national development project could not succeed, he argued, unless it conceived, designed, and built its own scientific and technological approach. In Venezuela, this project took on institutional form in 1999, when Chávez came to power. The Scientific-Peasant Alliance and the National Scientific Seedbeds Programme (Semilleros) are two of its manifestations: one sows seeds, the other sows vocations. By bringing farmers and young people into scientific work, these initiatives also raise another question: who is recognised as a producer of knowledge, and who decides?

What Kind of Science? For What Purpose, and Who Produces It?

In June 2007, speaking to a group of grassroots inventors, Hugo Chávez acknowledged that Venezuela needed technological mastery for reasons of sovereignty and security. However, recalling the Argentine scientist Oscar Varsavsky, he added that the primary problem was not 'know-how' but 'know-what'. Technology, he argued, should be neither an end in itself nor a commodity, but a means to meet needs. He concluded: 'we have an obligation to understand the purpose of every technology'.[4]

Varsavsky (1920–1976) devoted much of his work to a question that was uncomfortable for his profession: who decides what is researched and for what purpose? In *Science, Politics and Scientism*, he argued that the science of his time was not neutral but adapted to the social system that funded and organised it. He described 'scientism' as the attitude of researchers who adapted to this scientific market, ceased to concern themselves with the social significance of their work, and adopted the norms and values of the major international centres. For him, the decisive task was to set the research topics, assign priorities, and organise the work around the needs of social change.[5]

In *Towards a National Science Policy* (1972), he extended the argument to the realm of public policy. If a country framed its scientific development as 'closing the gap' with advanced nations, he warned, it effectively smuggled in the essence of their way of life. Every societal project, by contrast, required its own scientific and technological approach.[6]

What Varsavsky termed 'scientism' has a longer history. Modern science took shape alongside capitalism and Europe's colonial expansion from the 16th century onwards, with methods, values, and perspectives that this expansion imposed on the world as universal. It rested on a division between two planes of knowledge: that which distinguishes the true from the false, and that which distinguishes right from wrong. The former was taken to be objective knowledge and became science. The latter was assigned to the subjective realm of ethics.

Modern science was thus constructed in isolation from ethics. It declared itself objective and neutral, and proclaimed itself the only valid form of knowledge. It has undoubtedly brought great advances for humanity. Yet, alongside unprecedented scientific and technological development, humanity's major problems – inequality, poverty, hunger, disease, and environmental crisis – persist, and the way science is put to use has helped deepen some of them.

This contradiction is rooted in the economic and political relations within which science develops. Under capitalism, the accumulation of capital shapes research priorities, funding, the ownership of results, and the direction of innovation. Knowledge becomes a commodity, produced for expected profit rather than collective need.

The starkest example is that of weapons. On 28 February 2026, the United States and Israel went to war against Iran and, on the very first day, an attack on a girls' primary school in Minab killed more than 160 people, most of them children. Behind attacks such as this stand scientists and engineers trained at universities and research centres, working for military establishments and the corporations that supply them, and increasingly using artificial intelligence systems. Discussing the wider role of AI in military targeting, Bappa Sinha describes how Palantir's Maven system aggregates satellite imagery, drone footage, and signals intelligence to prioritise targets and recommend weaponry. With the Pentagon's own mantra that 'speed wins', he argues, the time taken to verify whether a building is a school or a barracks tends towards zero.[7]

Technical capability does not explain itself: it depends on who organises it and what agenda it serves. That is the distinction Chávez drew: technological mastery for reasons of sovereignty and security is one thing; technology placed at the service of a superpower's agenda over other peoples is quite another. As he said in 2006, 'there is no such thing as neutral science'. He argued that anyone who conducts research and claims not to be involved in politics is, in fact, involved in politics, because their work may strengthen the dominant system.[8]

The first question is 'what for?': which problems should science address, and for whose benefit? Answering it also requires asking who sets research priorities and controls the resources. The direction of science is not fixed: it can be contested and transformed, and with it, science policy.

The other question is who produces knowledge and who recognises it as valid. The presentation to Mincyt's 2025 collection of Chávez's speeches asks: is modern science 'above peasant knowledge, ancestral knowledge, or popular knowledge'? How can we ensure that 'the frameworks of knowledge of the wretched of the world and of history' are upheld and respected? The answer is a science that is 'community-based, participatory, diverse, and in solidarity with the oppressed', a 'science of the people – that is, of subalternity' – rooted in life or, in Chávez's words, 'for life, for happiness'. The presentation also warns against 'the academic trap': declaring a different kind of science does not eliminate the geopolitics of knowledge, which is 'a real struggle'.[9]

The science that is needed does not abandon rigour, nor does it have different laws of nature: those have no nationality. What changes is who asks the questions and what the answers are used for. Chávez described it as a dialectical process whose synthesis is the interaction of popular knowledge with academic knowledge.[10] The in vitro laboratory does not

compete with the memory of those who preserve native potatoes in the páramo, the high Andean grassland above the tree line; they need one another. This does not mean setting modern science aside. It means taking seriously what peasants and Indigenous peoples have learned over generations about seeds, soils, and plants – knowledge that colonial rule dismissed as backward and that capital has often appropriated – and testing it with the same rigour as any other claim.

Science and the National Project

Varsavsky argued that a society's scientific and technological 'style' should grow out of its national project. That style would guide the organisation of research and the choice of technologies, providing the basis for specific technological strategies.[11]

Chávez likewise linked technological choices to the society Venezuela sought to build. In April 2008, he rejected the idea of bridging the technological gap, arguing that this ambition meant adopting the 'Northern project', which he accused of putting science at the service of inequality and exploitation between countries. Venezuela had to build, not imitate. 'It is not a question of bridging any gap; it is a question of building, of inventing' a 'highly dynamic, highly diverse' style. That style, he specified, must come 'from our very core, from our history, our culture, our traditions' and be driven 'by our needs'.[12]

He also set out the needs this style should serve. 'We need a scientific-technological style to achieve our food security and sovereignty, and holistic human development' – that is to say, education, health, housing, and 'meeting the fundamental needs of the people'.[13]

But a distinctive style depends on the political choice about the society to be built. Varsavsky saw scientific autonomy as both a prerequisite for developing and carrying out a country's own national project and a consequence of that process.[14] In Venezuela, political change made it possible to turn this approach to science into public policy.

Venezuela: Two Sowings

When Hugo Chávez took office, Venezuela's public science sector depended on the National Council for Scientific and Technological Research (Conicit), which funded research projects. Chávez described the situation before 1999 in two sentences: science 'was reserved for an elite' and science and technology 'were hijacked'. What had to change, in his words, was what science and technology were for: they 'must be formidable instruments, not for the domination of minorities over majorities but, above all, for the liberation of majorities through knowledge, through scientific and technological research and its application to the social battle, to social development'.[15]

The institutional change was swift. In the first year of government, the Ministry of Science and Technology was established. The Constitution approved by a referendum in December 1999 incorporated science, technology, and innovation for the first time as matters of public interest (art. 110) and required the state to guarantee the ethical principles governing research.[16]

In 2000, a programme of productive cooperation networks – later renamed productive innovation networks – was launched to link rural producers with the research capacity of universities and specialist centres. In 2001, the Organic Law on Science, Technology, and Innovation (LOCTI), issued by decree, repealed the 1984 Conicit Act and transformed Conicit into the National Fund for Science, Technology, and Innovation (Fonacit). The law has since been reformed four times, in 2005, 2010, 2014, and 2022.[17]

Following the enactment of the LOCTI, research priorities shifted from individual disciplines, such as physics, chemistry, and biology, towards problems concerning food, health, energy, the environment, and education. A style of science was

promoted that sought to generate knowledge to construct a socially, politically, economically, and culturally just, equitable, and sustainable society. This reflected Varsavsky's argument that science must develop from its own roots to overcome its peripheral position.

Beginning with its first version in 2001 and developing through successive reforms, the law recognised traditional, ancestral, and popular knowledge and progressively broadened participation in scientific work to include communes and organised popular power.[18] Support extended beyond academic activity to projects arising from popular power, such as the Socialist Networks for Productive Innovation. Through these networks, organised groups of producers tested innovations to increase the production of food, goods, or services.

Particular emphasis was placed on networks linking different stages of research, disciplines, and institutions. Antivenom research illustrates this approach: studies of snake distribution were linked to research into venom properties, the development of antivenoms, and their production. A single network brought together taxonomy, biochemistry, immunology, and drug development and production. In 2021, researchers at the Institute for Advanced Studies Foundation (IDEA) and the Francisco de Miranda University were developing antivenoms for snake and scorpion bites.[19] These connections show how planning and cooperation can direct scientific work towards public needs, treating knowledge as the heritage of the people rather than a commodity.

Since 2003, the government has also turned to the 'missions', programmes operating alongside traditional institutions to address urgent needs in health, literacy, and university education. In 2006, the Science Mission was launched to integrate social and institutional actors into networks to generate and disseminate knowledge. In 2011, the Great Agro-Venezuela Mission set out to strengthen national food production with scientific and technological support. The Science Mission was the precursor to the 'Dr Humberto Fernández-Morán' Great Mission for Science, Technology and Innovation, which President Nicolás Maduro presented on 10 April 2024. Its five pillars included developing and preserving national scientific talent, and applying science, technology, and innovation for production.

The Scientific-Peasant Alliance formed part of science policy supporting food production, while the Semilleros fell under the first pillar. Food sovereignty was one of the areas where the Alliance put this approach to science into practice.

The Seed: The Scientific-Peasant Alliance

According to the Food and Agriculture Organization (FAO), the world produces enough food to feed everyone. Hunger therefore raises questions about what is produced, using which technologies, and how it is distributed.[20] The companies that promoted the Green Revolution through commercial seeds, fertilisers, and pesticides gained influence over what and how much to sow, how to distribute the harvests, and whom to finance. Seed patents and genetically modified organisms (GMOs) later became part of this system of corporate control. Within this framework, food is a commodity: it is worth whatever it can be exchanged for.

The foundations laid since 1999 enabled Venezuela to respond to the food crisis caused by the unilateral coercive measures imposed on the country. Mincyt and the Corporation for Scientific and Technological Development (Codecyt) could bring universities together and fund their work, drawing on the experience of socio-productive networks. In 2013, Codecyt joined the Association of Integrated Producers of the Páramo (Proinpa), a group of producers from Mérida, to scale up the socio-productive networks. Mincyt's 2025 publication, *Alianza Científico-Campesina*, records a 2014 decision to stop importing potato seed to strengthen national production. According to the publication, the subsequent intensification of the blockade prevented purchases on the international market, exposing the vulnerability of a food system reliant on imports and increasing the urgency of domestic seed production. The 2015 Seeds Act, which recognised the strategic importance of seeds for agricultural production, strengthened the legal framework for this work.[21]

When seed imports became impossible, the Alliance could draw on that work to produce pre-basic seed of different varieties. By January 2016, both organisations were publicly using the name 'Scientific-Peasant Alliance'. The Alliance grew out of earlier ministry work on socio-productive networks, among which Proinpa and others had made significant progress in organising producers and developing specific productive projects. Without these laws, institutions, and networks, a group of producers from the páramo region would hardly have had access to the laboratory facilities, resources, and recognition needed to produce seed on a national scale.[22]

Through seed banks, in vitro cultivation, agroecology, and networks linking communities and universities, the Alliance brings together their knowledge and resources for production. Cebisa, the laboratory in Mucuchíes, is its most visible manifestation.

The Mincyt book that systematises the Alliance's experience highlights cases such as that of Bernabé Torres, a 64-year-old farmer who takes part in the Alliance and whom it calls the guardian of native potatoes. He recounted how the Alliance and the University of Los Andes had supported the rescue and propagation of local and native seeds, and said that without science they would be nothing, because those who did not use it were filling the land with chemicals. For Torres, the work he and his fellow farmers were doing there was 'the future of this country'.[23] Recognition has also come from abroad: in 2026, the FAO named María Cantalicia Torres, a rural leader and seed guardian from the Venezuelan Andes, one of its 100 heroes in agrifood systems for her work recovering native potato varieties.

According to the account of the experience that Mincyt has published, by 2024, the Alliance had planted more than 30,000 hectares in accordance with its guidelines across all its crop sectors (potatoes, cocoa, coffee, maize, and others), involving more than 3,500 families in 18 states. The same account, in its epilogue, adds that the Alliance now propagates more than 150 varieties of potato seed, nearly 80 of them native to the Andes, and that its locally produced seed supports potato cultivation in more than 80% of the country's federal entities. It also reports that Cebisa saves the country more than US$460 million a year in imports.[24]

The Alliance builds partnerships between farmers and scientists to advance food sovereignty, and farmers' knowledge helps determine which seeds are propagated. Families collect and select the seeds with the greatest potential from their own territories and send them to laboratories for classification and improvement before they are returned. In practice, this is the synthesis of popular wisdom and academic knowledge that Chávez proposed. Community assemblies and conversations in the field, where producers who have worked with the Alliance share their experience, are one of the ways the approach reaches other farming families.[25] The aim is to put the country's talent and capabilities to work on needs found in the countryside, recognising traditional and ancestral knowledge and placing the advances of academic science at the service of the people.

One interviewee in the Mincyt book identifies new demands arising from the Alliance's expansion: strengthening its seed nuclei in each region, giving farming families comprehensive technical support, and ensuring that knowledge is effectively transferred. The interviewee also considers bringing new talent into research centres key to generating solutions suited to producers' needs. In these challenges lies an opportunity to deepen the Alliance's impact and establish it as a reference for linking scientific research and peasant production.[26]

The Semilleros: The National Scientific Seedbeds Programme

While the Alliance addresses the needs of the present, the Semilleros address the nation's future. The programme, which the Ministry of Science and Technology has run since 2019, reflects an idea central to Chávez's developmental model: the Bolivarian Revolution could not take 'a leap forward without science and technology'.[27] Sustaining that model also means

encouraging children and young people to pursue science and giving them opportunities to generate knowledge and solve problems. The first pillar of the Great Mission reflects this aim: sowing and preserving national scientific talent.

The two programmes are not separate worlds. Even before the formal launch of the Semilleros, the Alliance had forged links with schools in Mérida, where pupils and teachers were showing an interest in agriculture, ecosystems, and seeds, and had organised educational activities in the countryside. Alicia Cáceres, a biologist and researcher and professor at the Central University of Venezuela, is quoted in the Mincyt book on the Alliance describing the children who visit its laboratories: 'They ask questions, they take you along and tell you: "But I have a hypothesis". Everything is impressive!' Living alongside them, she adds, is something 'we hadn't had before, and now we do'. The programme also invites girls to take up science, so that they become the scientists of tomorrow.[28]

The National Scientific Seedbeds Programme, promoted by Mincyt, seeks to identify, train, and protect the scientific and technological talents of the future, guide early career choices, and strengthen science education amongst children and teenagers. Among its five components are 'productive science pathways', which bring students into contact with settings where science is directly linked to production, and educational robotics, with centres equipped with electronics and IT laboratories.

The programme, which has been running since 2019, offers several avenues for participation, including Olympiads, practical workshops, and school outreach. Outreach sessions involve entire secondary school year groups. In November 2026, 265 first-year secondary school pupils in the state of Sucre took part in activities involving microscopy, chemistry, physics, robotics, and astronomy. Another 655 pupils from the states of Portuguesa and Trujillo took part in practical workshops in June 2026.[29] According to Mincyt, the programme had already reached 562,695 children and young people in 2025.[30]

At the regional stage of the Creative Robotics Olympiad in Zulia state, one young participant presented an automated system for the initial processing of cocoa pods. The project was designed to support the Zulia Institute of Technological Research (INZIT) in the production of nutritious flours. Another participant designed a robot to monitor data from a manufacturing plant in real time.[31] These projects showed young people taking ownership of scientific knowledge and technological tools to address local needs. Here, robotics went beyond programming and building machines: it became a way to explore solutions to problems in food production and manufacturing.

Training new generations of scientists, engineers, and technologists also raises a question of values. Creativity, rigour, and the capacity for innovation are indispensable, but they must go hand in hand with social responsibility, dialogue, and reflection on the consequences of technological applications. Preparing people to develop sophisticated technologies must be accompanied by a public discussion of purposes and limits. It is essential to nurture a population capable of participating in these decisions regarding their use, thereby sustaining the nation's project.

The challenge is to turn participation into a career path. It is essential to ensure that those who have followed scientific pathways and attended robotics clubs go on to work in laboratories, factories, and the countryside, and that schools support this vocation through high-quality education.

Another Subject, Another Purpose

In Minab, a war imposed by the US and Israel killed scores of schoolchildren. In Mérida and Zulia, technical skills – measuring, cultivating, and programming – are directed towards producing seeds and training those who will continue to generate knowledge. Chávez called the producers, innovators, and scientists 'the seeds of the new homeland'.[32] The Alliance and the Semilleros are two ways of sowing them. In October 2026, the Alliance brought together more than 300

women producers from Mérida, Táchira, and Trujillo at a regional meeting in Mucuchíes.[33] Through the Semilleros, children and young people from ten municipalities in Zulia developed robotics projects to address local needs.

Political change made both programmes possible, and in 2026 they continue to operate. Their continuity depends on that framework being institutionalised through legislation, the budget, and popular power. The challenge is to secure those conditions over the long term.

Neither initiative alone solves the problems facing science. Together, however, they show how public policy can expand scientific capacities, recognise new producers of knowledge, and direct innovation towards collective needs when it begins by asking what science is for.

What other contexts can learn from this is not the scale or the conditions, but the approach: asking 'what for?' first, recognising those who produce knowledge outside the university, and training from an early stage those who will sustain the effort. For the Global South, the task is not to secure a seat at the table where the scientific 'centre' sets the agenda, but to set its own priorities.

In an era marked by artificial intelligence and large language models, the question of who directs technology and whom it serves is even more urgent. As Sinha points out, artificial intelligence has enormous potential in healthcare, climate science, and planning for human needs; the problem is when its development and use are subordinated to the war machine.[34] The ability to process information and automate tasks does not, in itself, determine which uses should be prioritised or who will benefit from them. Such decisions require public debate and participation in setting priorities.

A science for life is not a less rigorous or less advanced science. It is a science whose organisation, priorities, and applications address the question of its social purposes. Its direction and future are determined by what is researched, by who conducts the research, and by the national vision that underpins it. The decisive question is never what technology can do. It is who makes technology, and for whom.

Notes

[1] Mincyt, *Alianza Científico-Campesina: Ciencia, saberes ancestrales y buen vivir al servicio de la soberanía alimentaria de Venezuela* (Mincyt, June 2025), pp. 18, 96, and 149.

[2] CNTI, 'The ingenuity of young people from Zulia shone at the 2025 Creative Robotics Olympiad' ['Ingenio de jóvenes zulianos brilló en Olimpiada de Robótica Creativa 2025'] (4 May 2025), cnti.gob.ve.

[3] Hugo Chávez Frías, 'Meeting with Grassroots Inventors in Support of National Technological Inventiveness', Ministerial Tower, Caracas, 19 June 2007, in *Chávez: The Battle for Consciousness* [*Chávez: la batalla por la conciencia*], comp. Nerliny Caruci, Rocío Cazal, and Juan Carlos Torres, 2nd ed. (Caracas: Fondo Editorial Mincyt, 2025), p. 200; Hugo Chávez Frías, 'Event of the Programme in Support of National Technological Inventiveness', Los Caobos Park, Caracas, 26 April 2008, in *Battle for Consciousness*, p. 36. All translations from the Spanish are by the authors.

[4] Chávez, 'Meeting with Grassroots Inventors', p. 200.

[5] Oscar Varsavsky, *Science, Politics and Scientism* [*Ciencia, política y cientificismo*] (Utopía Pirata, 2018), pp. 12–13, 33, 49, 59–60, and 116.

[6] Oscar Varsavsky, *Towards a National Science Policy* [*Hacia una política científica nacional*] (Monte Ávila Editores Latinoamericana and Fonacit, 2006; first published 1972), p. 1.

[7] Bappa Sinha, 'Kill chain: Silicon Valley, AI, and the war on Iran', *Peoples Dispatch* (27 March 2026), peoplesdispatch.org.

[8] Chávez, 'Knowledge for Our Endogenous Development', talk, Santa Bárbara de Maturín, Monagas State, 23 September 2006, in *Battle for Consciousness*, p. 176.

[9] Gabriela Jiménez-Ramírez, 'The Challenge of Creating Community-Based Science', presentation, in *Battle for Consciousness*, pp. 13–18.

[10] On the universality of the laws of science and the national character of technology, see Luis F. Marcano González, foreword to *Battle for Consciousness*, p. 22; on the dialectic of popular and academic knowledge, see Chávez, 'Meeting with Grassroots Inventors', p. 201.

[11] Varsavsky, *Towards a National Science Policy*, pp. 9, 22–23, and 84–85.

[12] Chávez, 'Event of the Programme in Support of National Technological Inventiveness', pp. 33 and 36–37.

[13] Chávez, 'Event of the Programme', p. 35.

[14] Varsavsky, *Towards a National Science Policy*, p. 1.

[15] The description of the situation in 1999, and the chronology of laws and missions up to 2011 that follows, draw on Luis F. Marcano González, foreword to *Battle for Consciousness*, pp. 24–27. On Chávez's remarks, see Chávez, speech at the inspection of INIA projects, Sabaneta, Barinas, 15 September 2012, in *Battle for Consciousness*, p. 237 ('reserved for an elite'); Chávez, installation of the Infocentro of Propatria, Caracas, 21 November 2003, in *Battle for Consciousness*, p. 136 ('hijacked', and the passage on science and technology as instruments of liberation); see also Chávez, promulgation of the Science, Technology and Innovation Law, Caracas, 2 October 2001, in *Battle for Consciousness*, p. 279, where science is likewise described as 'reduced fundamentally to an elite'.

[16] Constitution of the Bolivarian Republic of Venezuela (1999), art. 110.

[17] Organic Law Partially Amending the Decree with Rank, Value and Force of Organic Law on Science, Technology and Innovation, Official Gazette No. 6,693 (Extraordinary), 1 April 2022, sapi.gob.ve.

[18] Organic Law Partially Amending the LOCTI (2022), arts 3(4), 4(1), 4(5), 4(6), 23, and 25.

[19] Ministerio del Poder Popular para Ciencia y Tecnología (@Mincyt_VE), 'Researchers from IDEA and the Francisco de Miranda University develop antivenoms that counteract the effects of snake and scorpion bites' ['Investigadores del IDEA y de la Universidad Francisco de Miranda desarrollan antivenenos que contrarrestan los efectos causados por mordedura de serpientes y escorpiones'], X (23 December 2021), x.com.

[20] FAO, 'About World Food Day', fao.org.

[21] Mincyt, *Alianza Científico-Campesina*, pp. 49–51, 54, and 88.

[22] Mincyt, *Alianza Científico-Campesina*, pp. 18, 50–51, and 89.

[23] Mincyt, *Alianza Científico-Campesina*, chap. II, 'El guardián de las papas nativas', pp. 26–31.

[24] Mincyt, *Alianza Científico-Campesina*, pp. 18 and 96; epilogue by Gabriela Jiménez, p. 149.

[25] Mincyt, *Alianza Científico-Campesina*, pp. 28–29, 34, and 93; on the synthesis of popular wisdom and academic knowledge, epilogue by Gabriela Jiménez, p. 147.

[26] Mincyt, *Alianza Científico-Campesina*, p. 99, in the section 'The Venezuelan woman scientist: Carla Contreras' ['La mujer científica venezolana: Carla Contreras'] (pp. 87–99).

[27] Chávez, *Aló Presidente*, no. 247, Ciudad Guayana, Bolívar State, 19 February 2006, in *Battle for Consciousness*, p. 101.

[28] Mincyt, *Alianza Científico-Campesina*, pp. 84–85 (testimony of Alicia Cáceres), p. 89 (links with schools), and p. 98 (girls and the Semilleros).

[29] Mincyt, 'More than 260 students explored science with the Scientific Seedbeds Massification Plan in Sucre' ['Más de 260 estudiantes exploraron la ciencia con el Plan de Masificación de Semilleros Científicos en Sucre'] (7 November 2026), mincyt.gob.ve; Mincyt, 'Second phase of Scientific Seedbeds rolled out in Portuguesa and Trujillo' ['Despliegan II fase de Semilleros Científicos en Portuguesa y Trujillo'] (18 June 2026), mincyt.gob.ve.

[30] Mincyt, 'National Scientific Seedbeds Programme projects territorial expansion in 2026' ['Programa Nacional Semilleros Científicos proyecta expansión territorial en 2026'] (22 December 2025), mincyt.gob.ve.

[31] CNTI, 'The ingenuity of young people from Zulia'.

[32] Chávez, in *Battle for Consciousness*, p. 105.

[33] Mincyt, 'Regional meeting highlights the science and resilience of women farmers in the Venezuelan Andes' ['Encuentro Regional destaca la ciencia y resiliencia de la mujer agricultora en los Andes venezolanos'] (16 October 2026), mincyt.gob.ve.

[34] Sinha, 'Kill chain'.