

# ASIAN SEED

THE OFFICIAL PUBLICATION OF THE ASIA & PACIFIC SEED ASSOCIATION

## Cannabis Calling

Fundamentals of an emerging multi-billion dollar market

## Invest in China's Seed Industry

Officials ease restrictions on foreign ownership structure

## Young Smart Farmer

Meet the 21st century Thai farmer: young, innovative and organic

## Seed Agenda

APSA's technical committees discuss plans and programs for 2019 and beyond

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## Dr. Papassorn Wattanakulpakin

**INSIDE:** Exclusive interview with the head of Thailand's only ISTA accredited public seed testing laboratory

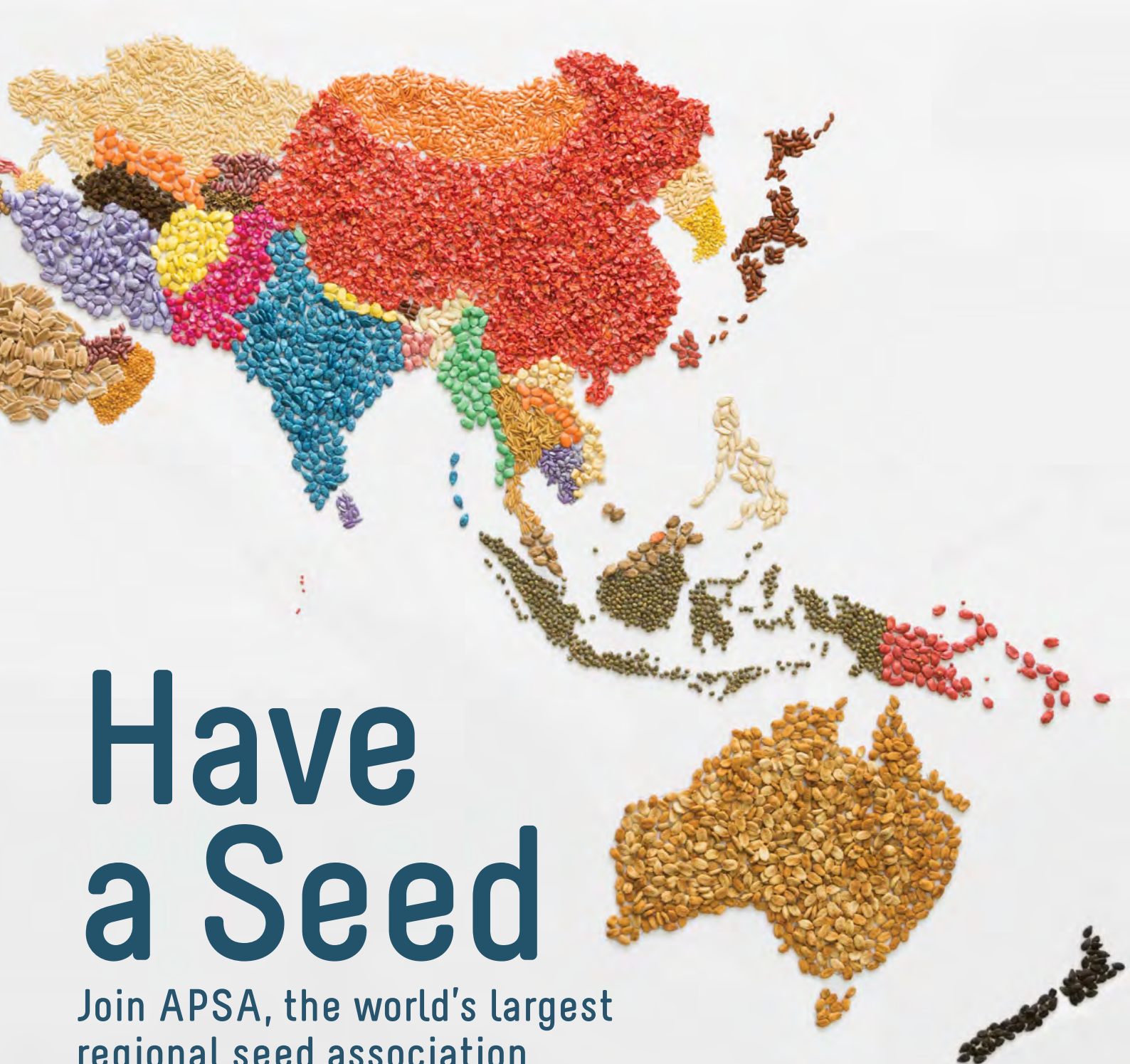


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# APSA Sprouts with Spring



Mr Tahir Saleemi  
APSA President

**Welcome to our first quarterly issue of *Asian Seed & Planting Material*. 2019 thus far has been a busy yet productive time for the seed industry. I am pleased to report that we are making steady progress in achieving APSA objectives discussed during last year's ASC and look forward to sustaining positive momentum during this important, transitional period for our association.**

That said, I have much to report in this letter.

First and foremost, the Executive Committee has reviewed and approved the minutes from APSA's 23<sup>rd</sup> and 24<sup>th</sup> General Assembly Meeting. We are all deeply pleased with the outcome of that meeting in Manila, and appreciate the support received from members and stakeholders, which ensures that the necessary steps towards APSA's international registration will be taken.

The GAM minutes have been uploaded to the members section of the Website and I encourage all voting representatives to log on, download and read them to recap the path forward.

Progress setting up our Singapore office and fine-tuning operations there move forward apace: we are now ready to process membership renewals. Please stand-by for further instructions in an email from the Secretariat.

Meanwhile, our staff in Bangkok continue productive in preparing

a number of important activities this year.

This month (April) in Bangkok, APSA is having midterm meetings attended by representatives from our Executive Committee, Special Interest Groups (SIGs), Standing Committees (SCs) and other working groups. It is a great opportunity for us to meet face-to-face – halfway between annual meetings – so as mutually to keep our priorities and agenda on track. This is the second year we've had a midterm meeting, which are now a permanent fixture on the APSA calendar.

Much of importance will be discussed. For example, we look to finalize APSA's newly-drafted Code of Ethics, amended from a previous version and revised with member input at the direction of our Working Group for Integrated Vegetable Seed Companies (WIC). Attention will also focus on strengthening awareness of how important are Intellectual Property Rights (IPR) to world food security.

That is likewise the theme of our Pre-Congress Workshop 25 November, a prelude to the 26th Asian Seed Congress in Kuala Lumpur, Malaysia. As producers, processors and traders in quality seed, we well know the importance of protecting investments, while promoting innovation and standardization through strong IPR. Yeoman's work yet lies ahead, however: stakeholders must be informed of the challenges – and that means educating them as to what they are, and, more importantly, how to overcome them.

We shall thereby ensure farmers an uninterrupted supply of quality seed, resulting in healthy crops and prosperous agriculture – both central to APSA's mission and consonant with our new motto: Quality Seed, Quality Life. These are the bases and key drivers for all of our meetings, campaigns, seminars, workshops and capacity-building activities.

To that end, we are currently planning Study Tours for later this year and beyond. SIG Vegetables and Ornamentals propose leading a group to Israel or Spain, while the SIGs for Hybrid Rice, Field and Forage Crops are planning a Study Tour to the Philippines and/or Vietnam. Planning for these is still in the preliminary stage: we will announce details as soon as they are confirmed.

Meanwhile, I am happy to confirm that APSA is moving forward with plans for another Expert Consultation on Phytosanitary Measures in Bangkok this August, as well as a third Asian Solanaceous Roundtable, set for Bangaluru, India in October. Finally, we are cooperating closely with the National Seed Association of Malaysia on programs for this November's 26th Asian Seed Congress in KL.

For details and updates about these and other APSA activities, check out the SIG and SC summaries on pages 32 – 35 of this magazine, APSA's members section on the Website and our newsletter. 🌱





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# Progress and Priorities



Dr. Kanokwan Chodchoey  
APSA Executive Director

On behalf of the APSA Secretariat, please accept our best wishes to you and your families. We cannot thank you enough for your support during our membership renewal and membership application transition process. We do our utmost at the Secretariat to improve operations, meet APSA objectives, and, what is most important, ensure member satisfaction.

Though this year is one of change, we are growing stronger together!

On the business side of things, let me first introduce a new addition to the Secretariat's organization chart: Mr Visavesa (or Jerry) is onboard as ICT officer, responsible for media affairs, graphic design and IT. Find out more about him on page 36.

Next, we had a productive meeting with the National Seed Association of Malaysia in January to work on the ASC2019 action plan. We are excited by the great program the National Organizing Committee team is assembling.

We also conducted the first SIG and SC meetings in January and February: all SIG and SC committees are keen on planning activities for the APSA midterm meeting, Study Tours, workshops, and technical sessions for ASC2019. You will find the key discussion points on pages 32 – 35.

Our priorities this year focus sharply on Intellectual Property Rights (IPR) protection – our theme for ASC2019 – and on trading in quality seed via phytosanitary measures (e.g.: ISPM38 implementation and the Systems Approach Initiative).

Another issue involves developing public-private partnerships. We are in quite positive collaboration with Thailand's National Science and Technology Development Agency (NSTDA, under the Ministry of Science), evidenced by the Memorandum of Understanding between APSA and NSTDA, already approved.

We will update members on the signing ceremony soon.

We recently visited the Indian Institute of Horticultural Research (IIHR) and the Indian Council of Agricultural Research to collaborate on organizing the third Asian Solanaceous Roundtable, 22 – 25 October, in Bengaluru, India (see page 37). We will share the draft agenda thereof by April as now we are still working with the R&D advisory team on planning. We want to ensure the most up-to-date breeding technology on Solanaceae crops is included.

Registration for the APSA - World Vegetable Center Annual Workshop in Tainan also opened this month. There are a number of additional benefits of joining the Consortium detailed on page 30.

Out of Asia: in February I had a chance to attend the Vegetable and Flower Conference organized by the American Seed Trade Association in Orlando, Florida. I want to thank Andy LaVigne (ASTA President and CEO) for affording me so many learning opportunities during all the new sessions ASTA has added to their program. I participated in the ISF Systems Approach Working Group, as well

as various committee meetings, including the ASTA board's opening session.

I was greatly impressed by their strategic plan, which affords insights APSA can use in various areas – especially IPR, Plant Breeding Innovation and the Systems Approach Initiative.

Around the office, we are concentrated on operational excellence (to improve membership engagement) and building the capacity of our Secretariat team, which includes bettering internal and external communication with stakeholders. Educational posters and videos are distinguishing components of our new communications platform.

Concerning this magazine: frequency of issues per year is reduced from bi-monthly to quarterly, the better to provide more concrete content. You shall see us increasingly on social media, however, where news impact is more immediate.

You will also notice that, since January, our Communications manager is posting regional agriculture news updates on APSA's website. Members can also follow news of upcoming activities through the monthly newsletter – thereby not to miss events happening around the globe.

Suggestions and comments are always welcome: you can keep us improving how we communicate our updates to you. Send your suggestions directly to me (may@apsaseed.org). 🌱



# Here's to a prosperous and productive year ahead

APSA would like to take this opportunity to thank all of our key government and non-governmental stakeholders in Thailand for their continued support and cooperation as APSA initiates international registration through our Singapore office. As Bangkok will continue to serve as APSA's main base of operations, we look forward to strengthening relations through sustained collaboration, partnerships and projects in Thailand, especially those related to education and capacity-building in quality seed production, breeding, trade, marketing and distribution.



*Dr. Chongrak Wachrinrat, Acting President of Kasetsart University (left) with APSA Executive Director Dr. Kanowan Chodchoey and Event Manager, Mike Kingpayom.*



*APSA Secretariat in January visited the Thai Seed Trade Association. Pictured here are THASTA President Dr. Chairerg Sagwansupyakorn (fourth left) and APSA Vice President, Wichai Laocharoenpornkul (far right).*



*From left: Pot Phetlorlian (APSA Technical Coordinator); Ms. Xiangjun Yao (FAO Regional Programme Leader for Asia and the Pacific); Dr. Kanokwan Chodchoey (APSA Executive Director); Dr. Kundhavi Kadiresan (Assistant Director-General and FAO Regional Representative for Asia and the Pacific); Ms. Kunaporn Phuntunil (APSA Technical Coordination Manager) and Ms Suchada Yansarasins (APSA PR Manager).*



*From Left: Dr. Pepijn Schreinemachers (WorldVeg Lead Scientist – Impact Evaluation); Dr. Marco Wopereis (WorldVeg Director General); Ms. Delphine Larrousse (WorldVeg Regional Director), Dr. Kanokwan Chodchoey; Ms Kunaporn Phuntunil and Dr. Narinder Dhillon (WorldVeg Vegetable Breeder – Cucurbits)*



*Dr. Krissanapong Sripongphankul (Director General of Thailand's Rice Department) with APSA's Dr. Kanokwan Chodchoey.*





## Kasetsart University celebrates 76 with fair & forum

**Thailand's Kasetsart University on February 2 celebrated its 76<sup>th</sup> anniversary with a street fair, market exhibitions and academic seminar themed around agricultural innovation.**

From January 25 to February 2, the premier agriculture institution hosted Thailand's annual National Agriculture Fair, more popularly known as the "Kaset Fair". Held at KU's main campus in Bang Khen, Bangkok, the theme for the fair was "Kasetsart Leading Thailand

in Advancing Innovation and Being Green"

The popular pedestrian street market and exhibition attracted hordes of students, teachers and visitors, who crowded campus roads to sample the street food, and shop for everything from tools and clothes to fresh fruits and beauty products. The campus was divided into a number of zones with exhibitions themed around the environment, agriculture and technology.

Also marking the occasion,

the university on February 1 organized Presidents Forum under the theme, "Universities as Hubs for AI [Artificial Intelligence] Research & Development". Presided over by Dr. Krissanapong Kiratikara, Chairman of Kasetsart's University Council, the annual conference brought together local and international academicians, diplomats and experts in the field of agriculture and technology, who deliberated on the theme in two sessions, which focused on the future of AI education at academic

institutions; and how AI will be implemented in urban agricultural development. Representatives from several prestigious research institutions and organizations participated in the forum, including from Curtin University, Australia; University of Miyazaki, Japan; National Chengchi University, Taiwan; the Vietnam National University of Agriculture, and International Institute of Technology (SIIT), Thammasat University and the National Electronics and Computer Technology Center (NECTEC) from Thailand.

## NSTDA Thailand launches technology evaluation tool

**To better match angel investors or government-sector offices with Thailand's business and technology innovators, an evaluation analysis tool created according to international standard has been released.**

The National Science and Technology Development Agency's (NSTDA) new Thailand Technology Rating Service (TTRS) was developed as a means for business owners to evaluate innovation and technology, and to share the results with interested parties.

The Internet-based tool is part of the Thailand Technology Rating System, an application of international standards derived by Thai developers in various fields – including finance, business and emerging technology – from study of the Korea Technology Finance

Corporation's Korean Technology Rating System.

The aim is to facilitate implementation of future tech by using universally recognized parameters to determine where a given new product or service lies on the famous 'S Curve' of innovation, which describes whether technology is emerging, mature or passé.

The TTRS is thus also an international-standard tool for analyzing marketing potential, thereby facilitating business development and funding support for Thai entrepreneurs.

The NSTDA calls the TTRS an "important component for success in business now and for the future." The accompanying graph shows how it works. 🌱

### TTRS Application Steps





# Myanmar NPPO Liberalizes Seed PRAs

Myanmar's National Plant Protection Organization (NPPO) – the Plant Protection Division (PPD) of the Ministry of Agriculture and Irrigation's Myanmar Agriculture Service office -- in February loosened import restrictions on seed for a wide array of comestibles. Entitled "Allowed import plants and plant products that do not need data information for Pest Risk Analysis (PRA)", the PPD document announcing liberalization lists various PRA-free agricultural products available for import from "any country".

Among products listed are 81 types of sowing seed, seedlings or bulbs, including most commercially popular vegetables, ornamentals, forage and field crops. Exceptions are noted for tuber seed potatoes, which still require PRAs unless seed is from Argentina, Australia, India, Korea, Netherlands or the US. (For details see table)

All exporting countries must still provide a PRA for Lily bulb (for planting), with Netherlands the sole exception.

Aside from seed, the list eliminates PRA requirements from any country for 37 fresh fruits; 21 cereals and legumes for consumption; 57 kinds of vegetable and culinary produce; five kinds of animal feed; eight plants or plant products for processing; coffee, cocoa and tea leaf; and any kind of cut flower. (The full list can be found on [ppdmyanmar.org](http://ppdmyanmar.org))

*\*Any country except Argentina, Australia, India, Korea, Netherlands and USA must provide data information of tuber seed potato (for planting) for Pest Risk Analysis (PRA) to NPPO-Myanmar.*

*Seeds/seedlings/bulb (total 81) for planting as per list are allowed to import from any country into Myanmar without providing data information for Pest Risk Analysis.*

Sr. No.	Planting (Seed/seedling)	Sr. No.	Planting (Seed/seedling)	Sr. No.	Planting (Seed/seedling)
1	Angled luffa	28	Cucumber	55	Parsley
2	Artichoke	29	Dolichos	56	Pasture legume
3	Ash Gourd	30	Dragon fruit	57	Pepper
4	Avocado	31	Eggplant	58	Perilla
5	Bean	32	Endive	59	Pigeon pea
6	Beet Root	33	Forage grass	60	Pisum pea
7	Bitter Gourd	34	Garlic	61	Pomelo
8	Black gram	35	Germinated Oil Palm Seed	62	Potato*
9	Black wattle	36	Gourd	63	Pumpkin
10	Bottle gourd	37	Green gram/ mung bean	64	Radish
11	Brassica Kohlrabi	38	Groundnut	65	Red garden beet
12	Broccoli	39	Holly oak	66	Rice
13	Cabbage	40	Kohlrabi (turnip)	67	Sesame
14	Capsicum	41	Leaf chicory	68	Shallot
15	Carrot	42	Leek	69	Snake Gourd
16	Cauliflower	43	Lettuce	70	Sorghum
17	Celery	44	Lily bulb**	71	Soybean
18	Cherry	45	Lima Bean	72	Spinach
19	Chick pea	46	Malva (medicinal & food)	73	Sponge gourd
20	Chicory	47	Melon	74	Squash
21	Chilli	48	Millet	75	Strawberry
22	Chrysanthemum	49	Mustard	76	Sunflower
23	Coriander	50	Oat	77	Swamp morning-glory
24	Corn salad	51	Okra	78	Tomato
25	Corn/ Maize	52	Onion	79	Water melon
26	Cotton	53	Orchid	80	Wheat
27	Cow pea	54	Paprika Pimento	81	Yard Long bean

## Myanmar Rice Seed Sector Development team visits APSA Secretariat

The APSA Secretariat on February 15 warmly welcomed 21 members of Myanmar's Rice Seed Sector Development (RSSD) project.

Led by Project Head Mr Adreas Graf and Seed Sector Advisor Dr Arnab Gupta, the RSSD group visited Thailand as part of a project supported by Germany's Deutsche Welthungerhilfe e.V. (World Hunger Aid).

The team is engaged in boosting rice seed production as part of the Rice Seed Sector Project, which focuses on business development, quality control and sector co-ordination in the Ayeyarwady (Irrawaddy) Delta of Myanmar.

APSA Executive Director Dr Kanokwan Chodchoey welcomed the group and gave a brief



*Representatives of the RSSD project, led by Project Head Mr Adreas Graf (front row, third right) and Seed Sector Advisor Dr Arnab Gupta (front row, fourth right), visited the APSA Secretariat on February 15.*

introduction on APSA.

Also representing APSA were Public Relations Manager Ms Suchada Yansarasin, Membership Coordination Manager Mr Komsak Kamjing

and Technical Coordination Manager Ms Kunaporn Phuntunil, who spoke on APSA's history, objectives and activities.

Fruitful discussion ensued, centering on rice seed industry

issues in Thailand and Myanmar, and hybrid rice trends in Southeast Asia.

For more news and updates visit [apsaseed.org/news/](http://apsaseed.org/news/)



# Family fun at Farmnival Fair

**T**he 2018-2019 Chia Tai Fair truly lived up to its theme name, “Farmnival”, with visitors rejoicing in an agriculture-carnival-like atmosphere full of fun, enjoyment, recreation, education and health.

Indeed, the occasion brought out the interactive, innovative and entertaining aspects of the agricultural sector, appealing to a broad dynamic of visitors – from farmers to families, school children, youngsters to adults and senior citizens alike.

A special highlight of this year's FAIR was interactive AR (Augmented Reality) maps that displayed 3D images of highlighted zones and attractions utilizing smart phones in sync with conventional maps.

As visitors checked in to highlighted zones, the AR technology displayed a 3D depiction of a special mascot virtual event host named “Uncle Yim”.

Innovative smart farm and smart greenhouse technology was another key highlight of the Fair, with four technologies related to efficient farm management: Weather Station, Smart Watering, Smart Greenhouse and Dashboard Control.

Visitors had the opportunity to learn about these systems by engaging and interacting with professional engineers, who shared knowledge and expertise on innovative farming for enhanced agriculture.

Moreover, exotic plant varieties displayed at a special greenhouse left visitors amazed. The

showcased varieties included pumpkins of different shapes and sizes. Informative tips concerning the cultivation and care of these exotic plants in the greenhouse system were also provided. Specialty flowers such as lilies and tulips along with several other ornamental plants that can be used for decorative purposes were shown during the fair. Huge flower sculptures and gardens were perfectly set up for fantastic photo opportunities.

A new concept introduced at the fair was Chia Tai's model restaurant named ‘H2 Table by Chia Tai’, which proved to be a popular attraction for visitors. The restaurant model's specialty is micro greens, which provide high nutritional value when compared to mature vegetables.

These micro greens were grown using LED technology behind the H2 table kitchen. In addition, guests were delighted to sample, unique and exquisite dishes prepared from fresh vegetables harvested from Chia Tai's own farm. Visitors also indulged in ice-cream prepared from fresh ingredients featuring Chia Tai's own varieties of Melon Morakot, Purple Sweet Corn 737 and Pumpkin 342.

Chia Tai's new watermelon variety, “Thumbs Up” was also promoted during the fair. The variety is known for its excellent eating quality with firm, crispy, sweet taste and texture.

Enthusiasts who missed the grand event this year are encouraged to visit in coming years.

The 9th annual Chia Tai Fair was held 22 December to 13 January at the leading Thai seed company's 40 acre Choncharoen farm in Kanchanaburi, west Thailand.





# When Harvest Meets Happiness

East-West Seed in January held its annual public Field Day at two of its Thailand locations



APSA Secretariat staff (left); EWS Thailand General Manager Mr. Wichai Laocharoenpornkul leads EWS Founder Mr. Simon Groot through the field.

**C**ustomers from 22 countries in Asia, Africa, the Middle East and South America arrived in Thailand for a weeklong field showcase themed “Partners in Success” from 15-20 January in two locations: East-West Seed’s R&D center in Chiang Mai and its global headquarters in Nonthaburi.

Participants came from Brunei, Cambodia, China, Egypt, Guatemala, Hong Kong, India, Indonesia, Japan, Kuwait, Lebanon, Malaysia, Myanmar, Nigeria, Pakistan, Saudi Arabia, Sri Lanka, Sudan, Taiwan, Turkey and Vietnam.

During the public days, the company welcomed more than 30,000 people who were curious about growing vegetables in their own homes. The company sold over 17,000 pouches of Go Grow and Value Pack seeds in a span of three days.

The theme of the public days was “Happiness can be grown”, encouraging vegetable home gardening as a worthwhile hobby and a source of safe and nutritious food for the family.

The public event was officially inaugurated with a ceremony on January 18 at EWS’s headquarters in Sai Noi district on the outskirts of Bangkok.

It was attended by hundreds of local and international guests, who came to inspect more than 300 of the company’s vegetable varieties on display, including 140 brand new varieties beautifully exhibited in thoughtfully prepared zones spanning a fair portion of the property’s three-and-a-half-plus hectares.

The inauguration ceremony was presided over by members of East-West’s Supervisory Board, including Honorary Chairman and Founder Mr. Simon Groot;

Chairman Mr. Ard Groot; President & CEO Mr. Bert van der Feltz; Vice President Mr. Michel Devarreware; EWS India General Manager Mr. Dilip Rajan; EWS Thailand General Manager Mr. Wichai Laocharoenpornkul and R&D Vice President Mr. Simon Jan de Hoop.

Simon Groot officially inaugurated the event, expressing his “sense of pride in seeing a beautiful field of vegetables, a reminder of what this company truly stands for — serving smallholder vegetable farmers with quality seeds of improved vegetable varieties that will help them grow their productivity and income.”

On display in the field were more than 300 new EWS varieties of brassica, solanaceae, cucurbits, corn, okra, legumes, papaya and marigold.

Tech-savvy growers used the CropWiki app developed by East-West Seed, where users scan the QR code on the field tags to see more information about the products. CropWiki is available for download from the

App Store (for iOS users) and Google Play (for Android users).

In Chiang Mai, the field featured several booths including the “Innovation Cafe” which highlighted the latest seed technologies and knowledge transfer; the “Taste Corner” with snacks and refreshments made from East-West Seed vegetable varieties; and the “EWS Supermarket” which displayed fresh vegetables for modern retail.

In Nonthaburi, field day attendees got to “see, taste, shop, and share” the special vegetable varieties in a beautifully manicured field. It was the biggest crowd the company has ever hosted.

Earlier this year, East-West Seed was ranked #1 in the 2019 Access to Seeds Index for South and Southeast Asia, besting 23 other companies on commitment, performance, and transparency in seven measurement areas: Governance & Strategy, Genetic Resources, Intellectual Property, Research & Development, Seed Production, Marketing & Sales, and Capacity Building. 🌱





# The Organic Activist of Maha Sarakham

**"Folks generally say being a farmer is hard,"**

**Young Smart Farmer Pongpat Kaewpanao observed,**

**"but I think it's pretty easy. You have lots of free time: plant your vegetables in the morning; in the evening, water them. Aside from that, you're free the whole day to do whatever you want."**

Pongpat graduated from Chiang Mai's Maejo agricultural university, where the school motto is "hard work never kills anyone" – which accounts, perhaps, for his singular perspective. The 26-year-old from Yang Si Surat in Thailand's northeastern Maha Sarakham Province has a passion for organic farming that is leading him into walks of life most farmers can only dream of.

Pongpat was a gifted student, to be sure: after finishing his baccalaureate in Agricultural Development Extension and Communications, he went to Israel for a year as an exchange student, studying agriculture and community management. The Ministry of Foreign Affairs then sent him on a study tour of the Netherlands.

Upon return, he assembled a group of 15 families to produce organic mushrooms in their village and set up a learning center to provide instruction and moral support. The first two years, he explained, were difficult, because chemical-free production was novel, and the group was weaned only gradually from chemical dependence. His project has been underway six years now, and, for the last three, "it's

been one-hundred percent organic."

He started from scratch and – despite his rather breezy assertions regarding how easy it is to farm – had a tough time: his parents wanted him to join the civil service and forget about organic farming activism; his villagers could be critical; he had no capital and less experience. Worse still, even the environment conspired to defeat his plans as drought descended on the land, the soil of which was too saline.

Pongpat was dismayed but far from surrendering. He overcame every obstacle methodically, proceeding step-by-step. "When I went to study in the Netherlands," he said, "I was impressed by the prevailing concept there – that to solve problems for good, you have to solve them at the source, not at the finish."

The first difficulty was to secure daily income for his farmers. To do that, he needed a market; so he surveyed local food stores. Armed with that information, he set about supplying their needs, while also opening a delivery service for chemical-free vegetables.

To ensure the supply of produce, he sat down with his farmers, one by one, and taught time management skills, explaining they should work from 6.00 – 8.00 AM mornings, and

4.00 – 6.00 PM evenings, "leaving the rest of the day for errands and time with family," he said.

At the learning center, he mapped out the production planning life-cycle of each vegetable, so farmers could understand how different growing seasons intersect. After harvest, farmers were instructed to bring their produce to Pongpat's home (now called the Kaewpanao Organic Farm) where they deposited it in baskets: each has the individual grower's name to ensure quality control. For villagers with problematic water or soil, he instructed them in composting and how to use manure. He consistently seeks out new distribution channels, as demand for organic produce strengthens. Today Pongpat has a network of 120 farming families in three villages, and has signed Memorandums of Understanding with two leading supermarkets in Bangkok, which have agreed to once-a-week deliveries of his organic produce.'

The latter includes: mushrooms, morning glory, spring onions, celery, sweet basil, spinach, coriander and lettuce – all certified "Organic Thailand" by the Department of Agriculture.

Among his projects are a Manure Bank, which collects livestock waste, and a Leaves Village,





for composting – both aimed at reducing fertilizer costs for villagers while increasing income through fertilizer sales. He encourages farmers to plant such field crops as soybean, green bean and sun hemp to promote soil fertilization.

Pongpat's interest in organic fertilizers has made him a leader in the Young Farmers' composting program (the Leaves Fertilizer Program). His most ambitious project so far, he thinks, is creation of an "organic rice straw bank": farming members prepare their soil by keeping it chemical-free for two years, then grow rice for straw to use as fertilizer. The latter is cut and attractively packaged for sale to city dwellers,

who use it on potted plants or, by covering the soil, to maintain humidity in gardens.

One of the biggest headaches attendant on creating his rice straw bank is that many villagers are part of a chemical fertilizer co-operative, making their land unsuited to organic rice. Pongpat is therefore trying to convince them that chemical fertilizer, though easy to use, is nonetheless dangerous. The project is thus currently limited to those who already joined his organic vegetables group.

Pongpat built his own greenhouses and has received a grant from Thailand's National Science and Technology

Development Agency to evaluate which plants in Central Northeastern Thailand grow best in which sort of structure and under what climatic conditions: "I have to make notes on progress everyday and send the results to the NSTDA for six months," he said.

The greenhouse design is from Israel: "It affords control over the building and how the plants grow," Pongpat explained. "I control irrigation from an app on my smartphone." To control pests without resort to chemical poisons he is studying entomology.

Organic activist and grassroots business entrepreneur, a head of the Young Smart Farmer Learning Center of

Northeastern Thailand, Pongpat now is ambitious to see one of his own become a Royal Initiative Project, following the living path self-sufficiency economy principles of Thailand's late King Rama IX.

He has already sent an application.

By any measure, Pongpat's life so far has been a success: "I have proved to my family that, through [this type of] farming, I can support myself, support a family and support the community."

How much, in his case, does that support amount to? By his reckoning, about 30,000 baht (US\$958.16) each month, not including fertilizer sales. 🌱



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# Tropical Asia Hot for Seed Industry Investment

**Several South and Southeast Asian countries are now hotspots of investment for the world's leading seed companies, according to the authoritative list published by the Access to Seeds Foundation, an ally of the World Benchmarking Alliance.**

Published earlier this year, the "Access to Seeds' Index 2019 Global Seed Companies" surveyed investment activity related to breeding, production and processing of 13 leading global seed companies in 65 agricultural countries in Latin America; South and Southeast Asia; Western and Central Africa; and Eastern and Southern Africa.

The list finds India, Thailand, Indonesia, the Philippines and Vietnam among ten countries with the highest number of global seed companies investing in local seed business activities.

Others in the top ten were South Africa, Tanzania, Kenya, Guatemala and Peru.

Amsterdam-based Access to Seeds publishes the list as part of a series of regional and global seed-industry indices useful in evaluating regional and global trends. Focus is on the private sector with emphasis on smallholder farmers.

The Global Seed Companies Index ranked 13 field crop and vegetable seed companies on smallholder access to improved seeds; all are "global leaders" or "regional leaders with a global presence". They were (in order): East-West Seed, Syngenta, Bayer, Corteva Agriscience, Advanta, Limagrain, Monsanto, Rijk Zwaan, Bejo, Enza Zaden, Takii, KWS and Sakata.

Information covering seven categories was gathered during 2015–2017 and used to create the Global Access to Seeds Index

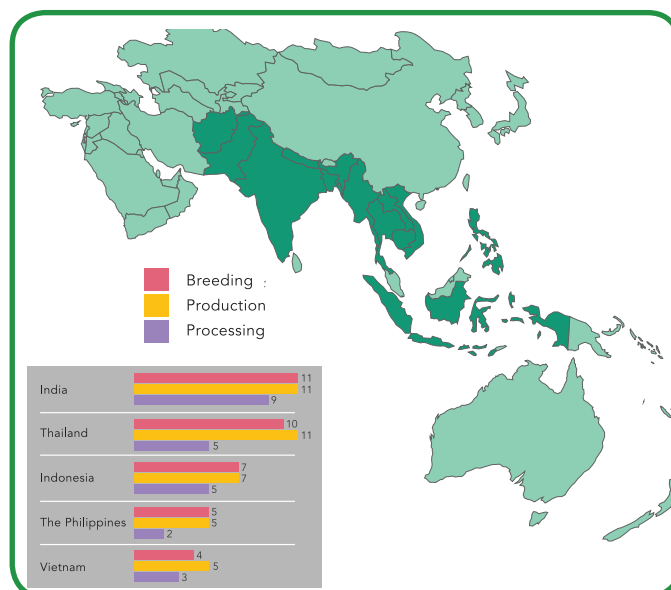
rankings: Governance & Strategy; Genetic Resources; Intellectual Property; Research & Development; Seed Production; Marketing & Sales; and Capacity Building.

Out of the focus regions, South and Southeast Asia showed the highest activity in three areas of investment: 12 of the 13 indexed companies invested in breeding and production; and nine had regional seed processing investments.

In Latin America, seven invested in breeding, nine in production and two in processing. In Eastern and Southern Africa, seven were in breeding, eight in production and five in processing. In Western and Central Africa, two had breeding operations, while only one was engaged in production, and none had established processing activities there.

Though almost all the companies had sales presence throughout the four target regions, extension activities were not nearly as ubiquitous. The exceptions were in South and Southeast Asia – where nine of the 13 companies had extension services. That compares to seven in Eastern and Southern Africa, four in Latin America and three in Western and Central Africa.

Of the 13 companies evaluated, 12 believe increased yields and higher tolerance to climate and weather risks are breeding essentials, resulting since 2016 in increased breeding for climate-resilient field crop and vegetable varieties. Broadening their



**RIPE FOR INVESTMENT:** 12 of the 13 indexed companies invested in breeding and production in five countries in South and Southeast Asia.

offerings, including provision of farmer training and other services (such as weather-based crop insurance), is how seed companies can help farmers adapt to change.

Eight companies now integrate sustainability strategies at the corporate level; only three did in 2016.

## QUALITY SEEDS FOR SMALLHOLDER FARMERS

According to Access to Seeds' press release, the 2019 Index aims at shining "a light on where the industry can do more to raise smallholder farmer productivity, improve nutrition and mitigate the effects of climate change through the development and dissemination of quality seed."

The Foundation's message is that much more needs doing to achieve those goals.

"Although public and private sector emphasis on capacity-building and technology-transfer for smallholder farmers continues to grow, estimated sales by global seed companies still reached only 47 million smallholder farmers

out of the 500 million who, according to the FAO, in 2017 accounted for the lion's share of global food production, or about 80 percent," said Ido Verhagen, Executive Director of the Access to Seeds Index.

Mr Verhagen explained that material change is impossible without reaching a larger percentage of such farmers; and that is not a matter of philanthropy, but hard-headed business sense.

"The private sector is essential for achieving food and nutrition security," said Mr Verhagen, who added that "the role of the global seed industry remains crucial if Zero Hunger is to be achieved by 2030."

The Access to Seeds Index 2019 – Global Seed Companies is one of the first Sustainable Development Goal benchmarks published by the World Benchmarking Alliance, the latter launched in September 2018 during the UN General Assembly. 🌱

The full list can be found at [accesstoseeds.org](https://accesstoseeds.org)



# Opening Wider and Wider

China easing restrictions on foreign investment in seed sector



**F**oreign entry into China's seed sector is easier than ever now that official measures have been implemented to significantly reduce restrictions on foreign direct investment in Chinese agriculture businesses. *Asian Seed* reports:

The latest developments came with the publication at the end of last year of two new "negative lists" that effectively increased shareholder quotas for foreign investors in numerous categories of business in China.

China is the world's largest agricultural market and under the latest rules, restrictions against foreign shareholding remain in only a few categories.

Indeed, foreign investment restrictions for most types of crop seed businesses have significantly eased. To help our readers understand the changes, challenges and opportunities, *Asian Seed* has examined these rules and herein provides a break-down of the most important factors.

*Disclaimer: this article should not substitute for legal advice, and investors are urged to seek professional counsel and perform due diligence before making any investment decisions.*

## LIST LEGITIMATIZATION

In a nutshell, the "negative lists" govern the types of businesses, places and ownership percentages allowed for foreigners, along with procedures, standards, and necessary approval steps for access. The two lists are distinct: one cannot be understood without reference to the other.

The latest, released 25 December by the National Development and Reform Commission, covers market access (2018 Negative

List MA). It is the first such list to unify prohibitions and licensing requirements throughout the country for both domestic and foreign firms. The other list governs foreign direct investment (FDI) and is called "Special Management Measures for Access to Foreign Investment" (2018 Negative List FI).

On both lists, industries are categorized either as "prohibited" or "restricted."

The 2018 Negative List MA includes 151 business activities that are tightly regulated or prohibited altogether. 'Prohibited' industries include those prohibited by Chinese law; projects banned under the Catalogue for Guiding Industry Restructuring; illegal finance operations; and internet-

*An employee at leading integrated vegetable seed company, Beijing Jewelry Seeds tends to a seed-canning line at a facility outside of Xingtai. Thanks to improved technology, capacity of Chinese seed companies is growing, but the demand for quality seed is growing faster, prompting the government to appeal for more foreign investment.*





related businesses.

"Restricted" industries fall into 18 sectors: agriculture; utilities; construction; wholesale and retail trades; transportation; warehousing; postal services; finance; accommodations; information technology and software; scientific research; environmental; education; health; social work; sports; culture and entertainment industries.

Seed business falls under the agriculture sector, and for this we can refer to rules mandated in the 2018 Negative List FI, while also taking into account other important stipulations in the 2018 Negative List MA in addition to other laws and regulations that dictate FDI in China.

### LEGAL ACCESS

FDI in China is covered by three principal laws: the Law on Wholly Foreign-Owned Enterprises; the Law on Sino-Foreign Equity Joint Ventures; and the Law on Sino-Foreign Cooperative Joint Ventures.

The 2018 Negative List MA must

be read together with the 2018 Negative List FI: prospective investors should first check the latter regarding whether foreign investments are permitted, and under which of the above ownership structures. They must next check the 2018 Negative List MA to see if licensing or certifications are needed and shareholder quotas permitted with respect to the target crop category. The 2018 Negative List FI includes executive or equity requirements for foreign companies; the 2018 Negative List MA cites market conditions and formalities necessary for market access and treats all alike – whether state-owned, private, jointly-owned or foreign firms.

Regarding only the 2018 Negative List FI: two versions were released by the Development and Reform Commission and the Ministry of Commerce – the "Special Management Measures for Access to Foreign Investment (negative list)", applicable throughout the country (called the "2018 National Edition"); and the "Special Management Measures for Access to Foreign Investment in the Free

Trade Pilot Zones" (the "2018 FTZ version").

In "prohibited" areas, provisions of the two negative lists are the same; but, in "restricted" areas, requirements differ regarding ratios of foreign investment. Note that the 2018 National Edition affords foreign investors opportunity throughout China, not merely in Free Trade Pilot Zones.

The Ministry of Agriculture and Rural Affairs has made clear the Chinese government's intention to open up China's seed industry, especially in promoting the development of high-quality seed, and plant variety protection. Also, the State Council's Notice On Some Measures of Actively and Effectively Utilizing Foreign Capital to Promote High-Quality Economic Development [Guofa (2018) 19] mandates cancellation or relaxation of restrictions on foreign seed industry investment.

China sees crop-seed as a "national, strategic, basic, core industry", one "fundamental to ensuring national food security". Opening it to foreign investment



is therefore: “conductive to quickening introduction of famous foreign, special, excellent and new varieties, speeding up rapid development of characteristic crops, and meeting the needs of the broad masses for special agricultural products.”

China National Seed Trade Association General Secretary Weihong Alison Tian told *Asian Seed* that implementation of the latest measures to ease restrictions on foreign investment will effectively promote research, development, trade and circulation of quality seed in China.

She explained that the 2018 Negative List FI comprises a national version and a free trade zone version, thereby affording greater latitude for investment.

“These measures,” she said, “significantly increase the extent to which the seed industry is opening,” and enable establishment of “Wholly-Owned Foreign Entities” operating directly in China’s seed industry.

CNSTA chief Weihong affirmed that the “environment for foreign investment” can only grow better as China enhances protection and enforcement of intellectual property rights.

Though 100 per cent foreign ownership of some categories is theoretically possible now, foreign investors in many “restricted” categories may still need to consider limited joint ventures with Chinese partners – and they may need Ministry of Commerce approval before investing.

Foreign investors are, however, afforded equal treatment (except in regard to record-filing) with domestic Chinese entities for industries omitted from a negative list – which is why the latest lists are so important, as they remove restrictions on many categories of investment.

In Free Trade Zones, for example, they are reduced from 95 to 45 (along with 22 Special Management Measures).

## A NEED FOR SEED

*Though China is a global leader in the planting and production of many types of sowing seed, a majority is utilized domestically. Owing to the magnitude of seed demand, domestic supplies aren’t always sufficient, and the country procures the rest through imports. To ensure an uninterrupted supply, the Chinese government every year allocates duty-free import quotas for many types of seed and seedlings. This year’s quotas were revealed in the 2019 Seed Provenance Duty-Free Import Plan, announced by China’s Ministry of Agriculture and Rural Affairs and the State Forestry and Grassland Administration in February.*

*The stated objective of the plan is to “support the introduction and promotion of improved varieties, strengthen the protection of species resources, enrich China’s animal and plant resources, develop high quality, high yield and high efficiency agroforestry, and reduce the production cost of agricultural and forestry products.” Hence, duty-free quotas have been allocated this year for more than 86,000 tonnes of imported seed – 74,769.46 tonnes through the Ministry of Agriculture and Rural Affairs, and 11,749.8 tonnes through the State Forestry and Grassland Administration, as shown in the table.*

China 2019 Duty-free import plan for seeds (seedlings)			
Sowing Seeds		Duty-Free Quotas (tonnes)	
Serial Number	Item	State Forestry and Grassland Administration	Ministry of Agriculture and Rural Affairs
2	Fruit, dried fruit seeds (seedlings)	115	N/A
4	Pine, fir and cypress seeds	120	N/A
5	Eucalyptus and Acacia seeds	0.5	N/A
8	Seeds of Palm, Lacquer and Acer	11.2	N/A
10	Legume seed	N/A	4,950
11	Melon seed	N/A	175.82
16	Wheat seed	N/A	5
17	Maize seed	N/A	1,689.33
19	Other cereal seeds	N/A	105.5
21	Hemp seed	N/A	100
25	Tulip bulb	45	N/A
26	Lily bulbs	45	N/A
27	Gladiolus seed ball	31.5	N/A
20, 22, 23, 28, 29	Seeds of peanuts, rapeseed, sunflower seeds, sesame seeds and other oilseeds for planting	N/A	310.5
30	Beet seed	N/A	5,858.10
31	Alfalfa seed	480	5,400
32	Clover seed	480	1,865
33	Fescue	2,160	8,708
34	POA pratensis Seed	1,080	3,364
35	Ryegrass seed	3,120	18,661.50
38	Bermudagrass seed	408	N/A
42	Lawn seed	960	960
43	Seeds of other forage and forage plants	2,295	3,600
44	Flower seeds (seedlings, bulbs, stems)	48.6	N/A
45	Vegetables seed	N/A	18,941.77
46	Seeds, fruits and spores for other cultivations	350	74.94
*This list, which is not exhaustive, was compiled by APSA from two appendices that list duty-free quotas for various agricultural items, including not only sowing seeds, but crops and livestock. The full list is available through the Ministry of Agriculture and Rural Affairs. **Remark: For the specifications, refer to the remarks of the “examination and approval form for the entry (exit) of Animal and Plant Seedling Seeds of the Ministry of Agriculture of the People’s Republic of China”		11,749.80	74,769.46
		86,519.26 Tonnes	

## 2018 Approval List for Agricultural Genetically Modified Organisms (GMOs) Import Safety Certificates

NO	Approval NO	Genetically modified organisms	Company	Usage Purpose	Validity Period
1/1/1900	Nongji'an Zheng Zi (2018) No. 001	Herbicide-tolerant rape. RF3	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/2/1900	Nongji'an Zheng Zi (2018) No. 002	Herbicide-tolerant rape. MON 88302	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/3/1900	Nongji'an Zheng Zi (2018) No. 003	Insect-resistant and herbicide-resistant maize DP4114	Pioneer	Processing material	2018.12.20 - 2021.12.20
1/4/1900	Nongji'an Zheng Zi (2018) No. 004	Herbicide-resistant soybean SYHT0H2	Syngenta, BASF Seed LTD (Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/5/1900	Nongji'an Zheng Zi (2018) No. 005	Herbicide-resistant soybean DAS-44406-6	Dow Agrosciences China Ltd.	Processing material	2018.12.20 - 2021.12.20
1/6/1900	Nongji'an Zheng Zi (2018) No. 006 (Renewal)	Herbicide-resistant soybean A2704-12	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/7/1900	Nongji'an Zheng Zi (2018) No. 007 (Renewal)	Insect-resistant and herbicide-resistant cotton T304-40	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2023.12.20
1/8/1900	Nongji'an Zheng Zi (2018) No. 008 (Renewal)	Insect-resistant and herbicide-resistant cotton GHB119	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2023.12.20
1/9/1900	Nongji'an Zheng Zi (2018) No. 009 (Renewal)	Herbicide-resistant rape Ms1Rf1	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/10/1900	Nongji'an Zheng Zi (2018) No. 010 (Renewal)	Herbicide-resistant rape Ms1Rf2	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/11/1900	Nongji'an Zheng Zi (2018) No. 011 (Renewal)	Herbicide-resistant rape Topas19/2	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20
1/12/1900	Nongji'an Zheng Zi (2018) No. 012 (Renewal)	Herbicide-resistant soybean CV127	BASF agrochemical co., Ltd.	Processing material	2018.12.20 - 2021.12.20
1/13/1900	Nongji'an Zheng Zi (2018) No. 013 (Renewal)	Insect-resistant soybean MON 87701	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/14/1900	Nongji'an Zheng Zi (2018) No. 014 (Renewal)	Quality Improvement Soybean MON 87769	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/15/1900	Nongji'an Zheng Zi (2018) No. 015 (Renewal)	Herbicide-resistant soybean MON 87708	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/16/1900	Nongji'an Zheng Zi (2018) No. 016 (Renewal)	Insect-resistant and herbicide-resistant soybean MON 87701xMON 89788	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/17/1900	Nongji'an Zheng Zi (2018) No. 017 (Renewal)	Herbicide-resistant soybean GTS40-3-2	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/18/1900	Nongji'an Zheng Zi (2018) No. 018 (Renewal)	Herbicide-resistant maize NK603	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/19/1900	Nongji'an Zheng Zi (2018) No. 019 (Renewal)	Insect-resistant maize MON 810	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/20/1900	Nongji'an Zheng Zi (2018) No. 020 (Renewal)	Insect-resistant and herbicide-resistant maize MON 88017	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/21/1900	Nongji'an Zheng Zi (2018) No. 021 (Renewal)	Drought-tolerant maize MON 87460	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/22/1900	Nongji'an Zheng Zi (2018) No. 022 (Renewal)	Insect-resistant maize MON 89034	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/23/1900	Nongji'an Zheng Zi (2018) No. 023 (Renewal)	Herbicide-resistant rape GT73	MONSANTO FAR EAST LTD	Processing material	2018.12.20 - 2021.12.20
1/24/1900	Nongji'an Zheng Zi (2018) No. 024 (Renewal)	Insect-resistant maize TC1507	Pioneer; Dow Agrosciences China Ltd.	Processing material	2018.12.20 - 2021.12.20
1/25/1900	Nongji'an Zheng Zi (2018) No. 025 (Renewal)	Insect-resistant maize 59122	Pioneer; Dow Agrosciences China Ltd.	Processing material	2018.12.20 - 2021.12.20
1/26/1900	Nongji'an Zheng Zi (2018) No. 026 (Renewal)	Insect-resistant maize Bt11	Syngenta	Processing material	2018.12.20 - 2021.12.20
1/27/1900	Nongji'an Zheng Zi (2018) No. 027 (Renewal)	Herbicide-resistant maize GA21	Syngenta	Processing material	2018.12.20 - 2021.12.20
1/28/1900	Nongji'an Zheng Zi (2018) No. 028(Renewal)	Insect-resistant maize MIR604	Syngenta	Processing material	2018.12.20 - 2021.12.20
1/29/1900	Nongji'an Zheng Zi (2018) No. 029 (Renewal)	Quality improvement maize 3272	Syngenta	Processing material	2018.12.20 - 2021.12.20
1/30/1900	Nongji'an Zheng Zi (2018) No. 030 (Renewal)	Insect-resistant maize Bt176	Syngenta	Processing material	2018.12.20 - 2021.12.20
1/31/1900	Nongji'an Zheng Zi (2018) No. 031 (Renewal)	Herbicide-resistant soybean FG72	BASF Seed LTD(Original applicant is Bayer)	Processing material	2018.12.20 - 2021.12.20





A vegetable seed distributor recommends new varieties to a seed trader at the Beijing Seed Congress last October. China hosts dozens of agriculture and seed exhibitions annually.

## SHAREHOLDING RULES

In 2017, China permitted up to 49% foreign ownership of agricultural ventures, covering most crops. The 2018 list removed most percentage restrictions on foreign ownership, while maintaining the Chinese share requirement for maize and wheat ventures at no less than 51%.

However, if the investment in these two staple crop categories is located in a pilot special economic free trade zone, the Chinese share requirement is only 34%. As for other crops not mentioned – including most vegetable and forage types – the door is essentially swung wide open.

Several items on the 2018 Negative List FI, however, are specifically restricted or prohibited.

- New wheat and maize variety breeding, and seed production, remain under Chinese control.
- Foreign investment in “research and development, breeding, planting and

production of related breeding materials (including fine genes for planting, animal husbandry and aquaculture) of rare and unique, precious varieties of fine varieties in China.”

- Foreign investment “in crops, breeding of livestock and poultry, breeding of transgenic aquatic seedlings and production of genetically modified seeds (seedlings).”
- Rice and soybean remain prohibited to foreign investment.

Though the import or production of GM seeds remains prohibited, some GM-crops have been approved for import into China. (See full list on opposite page)

## CONCLUSION

The door to China stands open, and, in future, investors can expect further simplification of examination and approval processes, while measures for administration of crop seed production, operating licenses

and changes in management are eased.

How serious are the Chinese about liberalizing foreign direct investment? Observers differ on how it will take shape at ground level. They frequently note, however, that the 2018 lists go far towards unifying market access, streamlining the system and – especially – establishing a rules-based investment regime.

At the policy level, the intent is clear: President and General Secretary of the Communist Party Xi Jinping at the 19<sup>th</sup> National Congress of the Communist Party of China announced in October 2017 that official national policy is to “open the door even wider.” The policy was amplified later in the Foreign Investment Industries Guidance Catalogue issued by the National Development and Reform Commission and the Ministry of Commerce.

President Xi has said since, “The pace of reform will not stagnate,” and the door “will only open wider and wider.” 🌱

# The Cannabis Conundrum

Legal barriers to the cannabis industry are falling across the globe, including in the APSA region, where several countries are beginning to adopt or adapt regulatory precedents that have made headlines in the Americas and Europe. Indeed, culminating nearly a century of strict prohibition of cannabis and its many derivatives, attitudes are evolving as the number of countries and territories that have legalized, regulated or “decriminalized” the plant for industrial, medical and recreational use grows. *Asian Seed* reports:

The World Health Organization’s Expert Committee on Drug Dependence (ECDD) recommended in January that cannabis and its resin be removed from Schedule IV of the United Nations’ Single Convention on Narcotic Drugs and placed in the least restrictive classification, Schedule 1, thereby paving the way for trade in medical use of cannabis. After re-scheduling, no government can cite international treaty obligations to enforce cannabis prohibition. To the contrary, governments will be obligated to ensure it is available for medical purposes.

As of March, 2019, Uruguay, Canada, the US capital, the District of Columbia, along with ten States – Alaska, California, Colorado, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, and Washington – have legalized cannabis for adult recreational use. (*Note: Specific rules for cultivation, trade and possession vary by jurisdiction.*)

Dozens more territories and countries have legalized, regulated or “decriminalized” the plant for industrial, medical and personal use. Among the most progressive of them are Belgium, the Netherlands, Luxembourg, Spain, Portugal, Malta, Italy, Czech Republic, Slovenia, Croatia, Switzerland, Estonia, Ukraine, Russia, Argentina, Ecuador, Colombia, Chile, Peru, Paraguay, Costa Rica, Jamaica, Mexico, and South Africa. A dozen more US States have decriminalized cannabis or legalized it for medical use, while full legalization at the federal level seems imminent. Indeed, the US government legalized hemp as an industrial crop with the enactment of the Farm Bill late in 2018, which enables hemp farmers to obtain funding and insurance through conventional financial institutions.

The wave of legislative reform suggests the prospect of multi-billion dollar markets opening up. Reform, however, doesn’t mean

free markets will ensue. Formidable impediments remain, with restrictions and penalties on recreational use in all but 32 countries – only two of which (Canada and Uruguay) do not forbid commercial sale of the plant for recreational use.

## MASSIVE MARKET

This complicated legal and political framework necessarily adumbrates market forecasts, especially as the plant has multifarious uses. The global industrial hemp market, for example, was pegged by Grand View Research Inc. at US\$3.9 billion in 2017, which – with a compound annual growth rate (CAGR) of 14% – will be worth US\$10.6 billion by 2025. The market includes seed, fiber and shives (fragments or raw fibers). They also forecast legalized medical and recreational derivatives from leaves and flower buds will top US\$146.4 billion by 2025.

On the other hand, a November 2017 report in *Forbes Magazine*

estimated the market then at US\$7.7 billion with a CAGR of 60% – leading to a US\$31.1 billion market in 2021. Meanwhile, the Arcview Research Group, in March 2018, was predicting a US\$57 billion world market in 2027.

Despite varying estimates, it’s probably safe to say the cannabis market has potential. (*See Seeds and Breeding section below*) So ambitious country-level guesstimates are emerging.

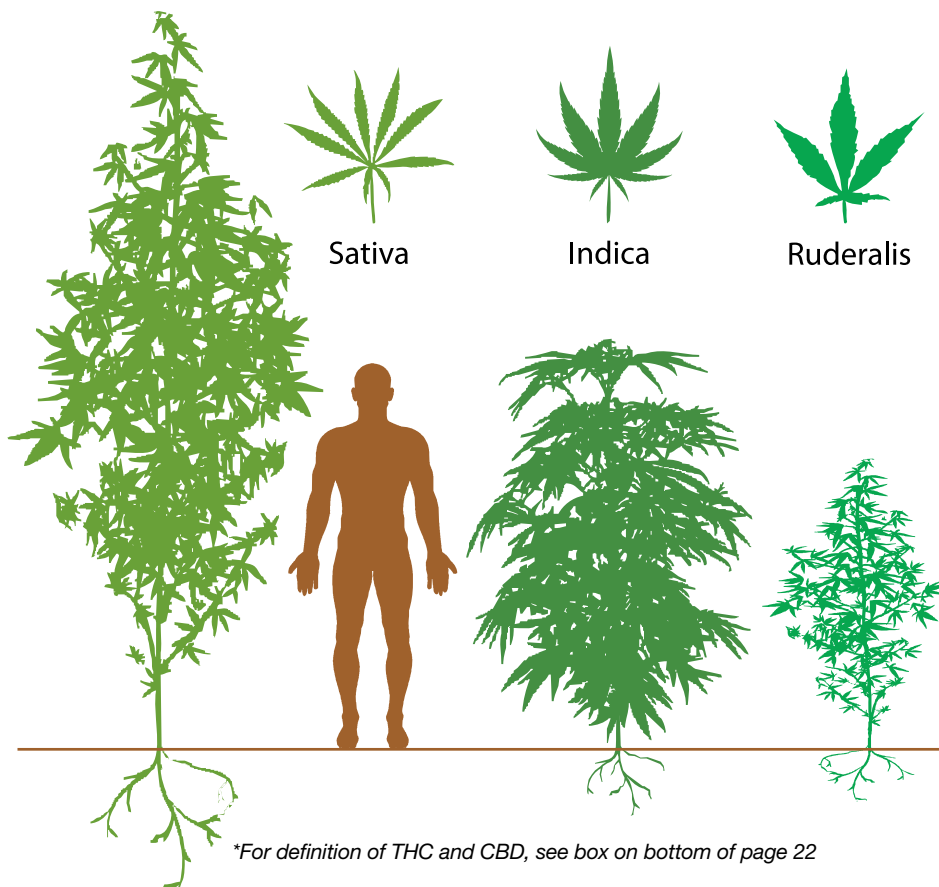
As a case in point: Thai officials in November 2018 said information suggested their share in the global cannabis market could amount annually to THB800 billion – about US\$25 billion, as reported by Thai PBS. If Thailand’s Agriculture Federation estimates of one tonne yielding THB1 million (US\$31,000) on the global market come true, 800,000 tonnes would meet the government’s figure.

Are such figures mere pie-in-the-sky – or can we count on them for meat



## Species – Subspecies

Though many traditional botanical texts hold that Cannabis itself is a genus with three species – Sativa, Indica and less-common Ruderalis – botanical nomenclature rules dictate that these should more precisely be classified as three subspecies under a single species, Cannabis sativa, which is generally shortened to just Cannabis. These three subspecies can all be interbred and most of the commercial strains or cultivars in circulation are in fact hybrid crosses between Sativa and Indica.



\*For definition of THC and CBD, see box on bottom of page 22

### **Cannabis sativa** **Subspc. *sativa***

*Preferred Climate: Equatorial and Tropical zones*  
*Seed to Seed: four to six months*  
*Leaves: Narrow*  
*Stalks: Tall & erect*  
*THC\* content: high (except industrial hemp cultivars)*

### **Cannabis sativa,** **subspc. *Indica***

*Preferred Climate: Subtropical and Temperate*  
*Seed to Seed: two to three months*  
*Leaves: Broad*  
*Stalks: Bushy*  
*CBD\* content: high*

### **Cannabis Sativa,** **subspc. *Ruderalis***

*Preferred Climate: Temperate*  
*Seed to Seed: one to two months*  
*Stalks: Short and bushy*  
*Commercial availability: rare*

and potatoes? A deeper understanding of the market's segments and pending legislation may assist evaluation.

### **HEMP INDUSTRY**

Generally speaking, the three main markets

are industrial, medical and recreational. Each requires significant quantities of seed, whether as grain or for sowing and breeding. It goes without saying that it is important to understand the key differences among subspecies and their

crosses. (See *Species – Subspecies box above*) Hemp is a generic term describing cannabis cultivated as a field crop for industry. Products include fiber, textiles, construction material, bio-plastics, feed, food supplements and

cosmetics. Recorded use of hemp for such purposes stretches back some 3,800 years to China, but earlier, widespread use may be inferred as it appears throughout Eurasia since earliest antiquity.

Intended use determines which hemp strains (cultivars) are best suited for cultivation. Cultivars grown for stalks produce fiber, textiles and construction material. Typically of the Sativa subspecies, they are several meters tall, with a four-to-six month life-cycle. To comply with anti-drug legislation, industrial hemp cultivars contain low levels of THC (see Cannabinoid 101 box), a psychoactive compound naturally concentrated in the resinous mature flowers of cannabis. Though flowers and leaves are little used in industrial hemp manufacturing, hemp-specific laws stipulate maximum THC concentrations permitted regardless of the part of plant sampled: typically between 0.3 (US) to 1% (Thailand) of dry weight. This is to ensure that such plants are non-psychoactive.

Cultivars of the Indica subspecies, which originated in the subtropic and temperate zones, affords hemp for food, health and cosmetic products or supplements. Products typically derive from the nutrient and oil rich seeds. Indica cultivars are bushier,

more broadleaved and shorter than their Sativa cousins. They have a much shorter life cycle: two to three months from seed to seed — ideal for indoor and greenhouse cultivation. Moreover, Indica varieties tend to have higher ratios of CBD to THC, which figures prominently in “medical marijuana” applications (see *Cannabinoid 101 box below*).

Seeds intended as foodstuff or oilseed are sold in bulk for processing into fine powder or pressed to extract oil. These form a basis for many food, health and cosmetic products.

## HEALTH & REC

“Marijuana” is a generic term for medicinal and recreational purposed cannabis, cultivated either as horticulture or field crop. While stalks and seeds are core raw materials for industrial hemp, the Sativa, Indica and less common Ruderalis flowers and leaves are most valued in medicinal and recreational applications. Thousands of hybrids have been developed crossing cultivars of these distinct subspecies.

Practically, medical and recreational marijuana differ only in intended use. Preparation and consumption are similar; the distinction is primarily legal. For recreation, dry cannabis buds, with their resin-rich flowers, are usually smoked via apparatus similar to that used in tobacco consumption. In medicinal applications, they are also processed into tinctures, waxes, oils, lotions, sprays, teas, butters and soups consumed directly or used as recipe ingredients.

In ancient times, the drug was sometimes regarded as a cure-all, the panacea for people who lisp, who are depressed, have indigestion, gas, dysentery and many other ailments. More recently cannabis has been determined useful in treating schizophrenia; epilepsy; the side effects of chemotherapy or radiation; HIV/AIDs; Parkinson’s disease; multiple sclerosis; Crohn’s disease, and helps heal broken bones, among other applications.

## CRIMINAL CANNABIS

The heartlands of cannabis culture famously stretch from Southeast

Asia and the Pacific through southern Asia to the Mediterranean Sea and along the North African littoral to Morocco. These countries gave the world its storied (if illicit) charas, hashish, bhang, kif and Thai-stick. Due to negative connotations afforded to the plant over decades of prohibition, stiff penalties and the stigma of drug use persist in most of these countries. As the West leads the way, however, the East is gradually following suit. (See *Country Maps section on pp 24 – 27*)

## SEEDS AND BREEDING

In nature, cannabis plants are prolific self-propagators, one plant yielding perhaps thousands of seeds. It can grow rapidly and wildly, which is why one of its most common nicknames is “weed”. In terms of sexual morphology the plant can be classified as monoecious or dioecious. Cannabis is generally dioecious, normally producing separate male and female plants; however, depending on cultivar and abiotic stress, females can spontaneously metamorphose into self-pollinating monocious plants – cannabis

# Cannabinoid 101

At the core of medical and recreational cannabis applications are cannabinoids: these are diverse chemical compounds occurring naturally in most complex living organisms.

Cannabinoids are found in plants in the form of phytocannabinoids, and in vertebrates and invertebrates as endocannabinoids. When consumed, phytocannabinoids emulate the function of endocannabinoids by binding with cannabinoid receptors as part of the mammalian immune response and regulation functions of the endocannabinoid system (ECS).

This binding process triggers certain neurological, physiological and psychological processes now well-documented by research – and in numerous patents. Moreover, though we naturally produce the endocannabinoids required for such processes, plant phytocannabinoids are an effective substitute for artificially enhancing or repairing the ECS.

They are found in only a handful of plant species besides cannabis: *Echinacea purpurea*, *Echinacea angustifolia*, *Acemella oleracea*, *Helichrysum umbraculigerum* and *Radula marginata*. Among these other species, phytocannabinoids are found in only limited amounts – but are abundant in cannabis.

Thus far 113 phytocannabinoids have been isolated from cannabis. Each has unique effects on the human ECS. Though researchers admit much remains to be learned about ECS, physiological and psychological phytocannabinoid effects, in recent decades a consensus has been arrived at regarding those of the two most widely-studied: cannabidiol (CBD) and tetrahydrocannabinol (THC). Hence the relevant statutes in place or being drafted cover CBD and THC – but not yet the 111 other cannabinoids.

To date, the World Intellectual Property Organization global database lists 791 patents concerning phytocannabinoids – 701 relate specifically to cannabis. They cover everything from treating cancer and neurological disorders to producing yeast and brewing alcoholic beverages.



## Harmonized System (HS) Codes for Cannabis Germplasm

International trade in cannabis seed is widely segmented, with multiple categories and codes applied to international consignments – which can cause headaches or open loopholes, depending on how you look at it. Following are some of the HS Codes that have recently been used in the international movement of cannabis or hemp seeds and seedlings. The list is not exhaustive.

1	1209991029: Cannabis Seeds for sowing: Used by Canada
2	1211909050: Cannabis plants, herbs & seeds used in pharmacy: Used by Canada
3	1207990011 Hemp seeds, for sowing: Used by Canada
4	1207990320: Hemp seeds, whether or not broken: Used by Canada, China India, Vietnam and Romania
5	12079991: Hemp seeds, whether or not broken (excl. for sowing): Used by France
6	1207990025: Oil seeds; hemp (cannabis) seeds, whether or not broken: Used by New Zealand
7	21069099: Hemp seed as nutritional supplement: Used by India for import and re-export
8	1211903999: Other plants and parts of plants, of a kind used primarily in pharmacy, fresh or dried, whether or not cut, crushed or powdered: Used in China
9	1211903930: Hemp (Cannabis sativa): Used by China
10	0602909: Hemp tree seedling: Used by China

cultivators call them ‘hermaphrodites’ – with both female flowers and self-induced pollen sacks. Male plants, however, never develop female flowers.

Seed intended for industrial hemp or as food or feed supplement is traded in bulk by kilogram or tonne, and relatively inexpensive. Raw hemp seed from China – a leading exporter of cannabis seeds – can be procured via Alibaba for US\$100 - US\$200 per kilogram, which contains about 70,000 average-sized seeds (70 seeds per gram).

By contrast, seed intended for medicinal or recreational cannabis, with specifically defined breeding and intellectual property requirements, is

traded by the gram – or by the seed itself. In North America’s legal markets, the most sought-after varieties can fetch US\$100 – \$200 per seed.

Owing to the cost of premium seeds, vegetative propagation of cannabis is common. By opting for fully mature “clones” of desirable varieties, growers not only reduce time and expense, but mitigate risks associated with failed germination, or vulnerable sprouts dying early. Thus seedling clones and cuttings are more commonly sold than seeds themselves in North American cannabis dispensaries and nurseries.

PVP registration and

enforcement necessarily remain in their infancy with regard to cannabis, as agreements harmonizing legal commercial-planting and trade issues are still forthcoming.

Nonetheless, 2017 global hemp seed market value was estimated by Wise Guy Reports at U\$380 million, with projected CAGR of 24% — which if realized, would see the market worth a cool US\$2.1 billion by 2025.

While these figures are for industrial or foodstuff hemp seeds, it is reasonable to conclude that some of these hemp seed consignments may be procured for breeding and research purposes, especially in cases where strict phytosanitary and

fumigation measures are not imposed on bulk shipments.

### CONCLUSION

As more governments across the globe mull easing or lifting cannabis restrictions and new markets emerge, the economic potential of this plant and its germplasm will grow. Still, it carries risk and investors would be well-advised to take a long view: full legalization remains a divisive issue and may take time to sort out in conservative jurisdictions.

Nonetheless, seed and breeding opportunities abound. Who will gain the most? Those with the right knowledge, personnel and technology – as usual. 🌱



Cannabis plants are generally dioecious, normally producing separate male and female plants. Photo by Petr Brož

# Cannabis Country Highlights

Though anti-narcotics laws in every country throughout the APSA region continue to restrict or prohibit the cultivation, possession, trade and consumption of cannabis for recreational purposes, region-wide legislative trends are aimed at regulating and monetizing industrial hemp and medical cannabis in the near term. Some key country developments are highlighted on the following pages.

## Legend



Medical Cannabis  
Medicine Trials



Medical Cannabis:  
Growing Trials



Pending Approval of  
Cannabis Cultivation



Industrial Hemp:  
Trials / Pilot



Industrial Hemp:  
Seed Production



Industrial Hemp:  
Commercial Production

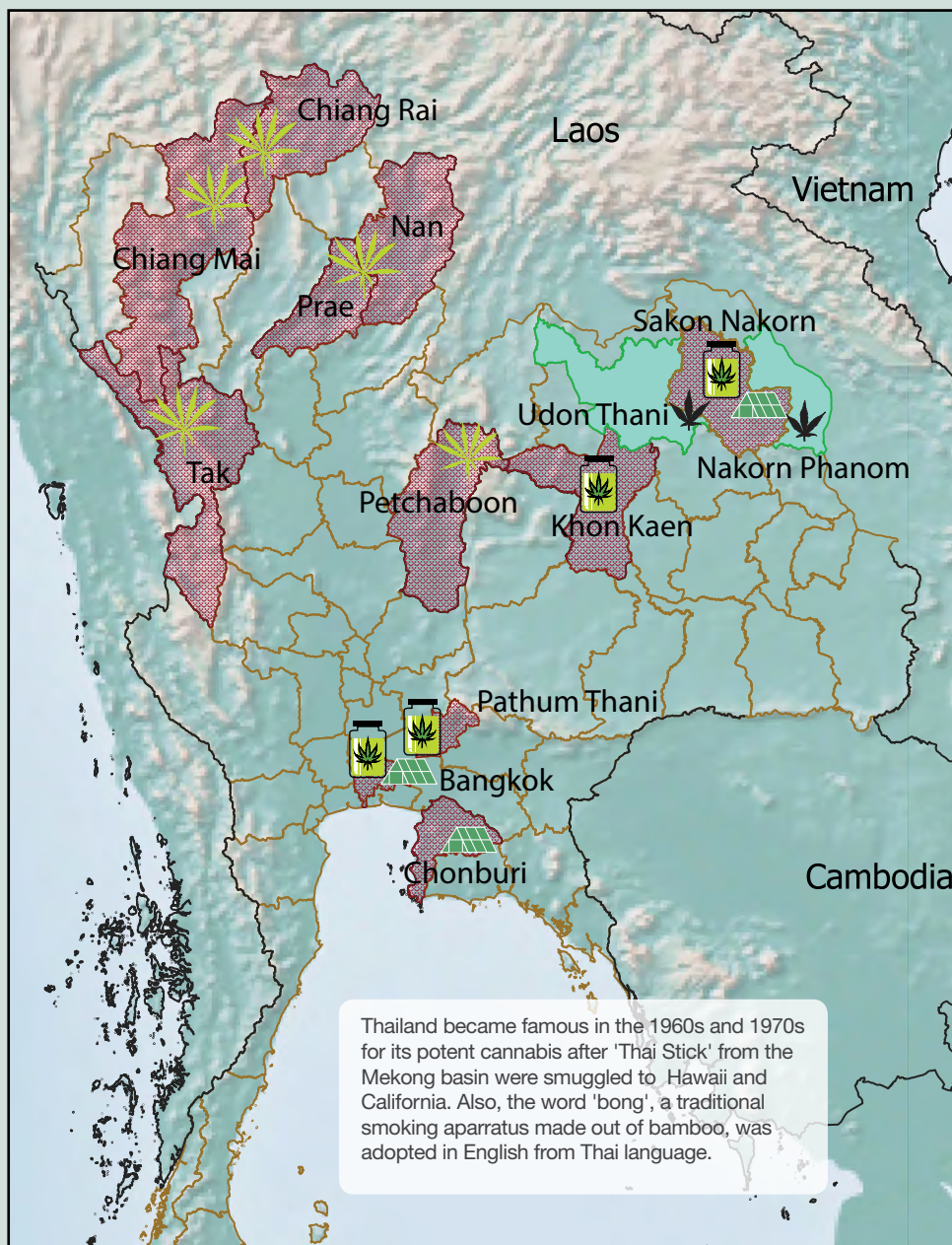


Illicit Cannabis Hotspots

*Disclaimer: The following maps are not definitive or exhaustive and should only serve as indicators for reference base on available info. For specific references, follow the link/QR code on the bottom of page 27.*

## Thailand

In February, Thailand officially became the first country in Southeast Asia to legalize cannabis for medical and research purposes through amendments to the Kingdom's Narcotics Act. The amendments follow the announcing of Ministerial Regulations in 2016 to regulate the production of low-THC hemp in several provinces. The current legal framework allows for authorized cultivation, possession and trade of specified forms of the plant and derivatives under strict supervision by provincial authorities, the Food and Drug Administration and The Narcotics Control Board. Investment in research projects is possible through Public Private Partnerships (PPP). Illicit recreational use is still strictly prohibited.





# China

Cannabis is widely believed to have originated in China, with utilization of all parts of the plant – for textiles and medicine – dating back many thousand years. Though illicit (recreational and medical) cannabis remains strictly restricted in China, the world's most populous country is in fact one of the largest producers of both raw hemp and cannabis seeds, with large production centers in Yunnan and Heilongjiang provinces.

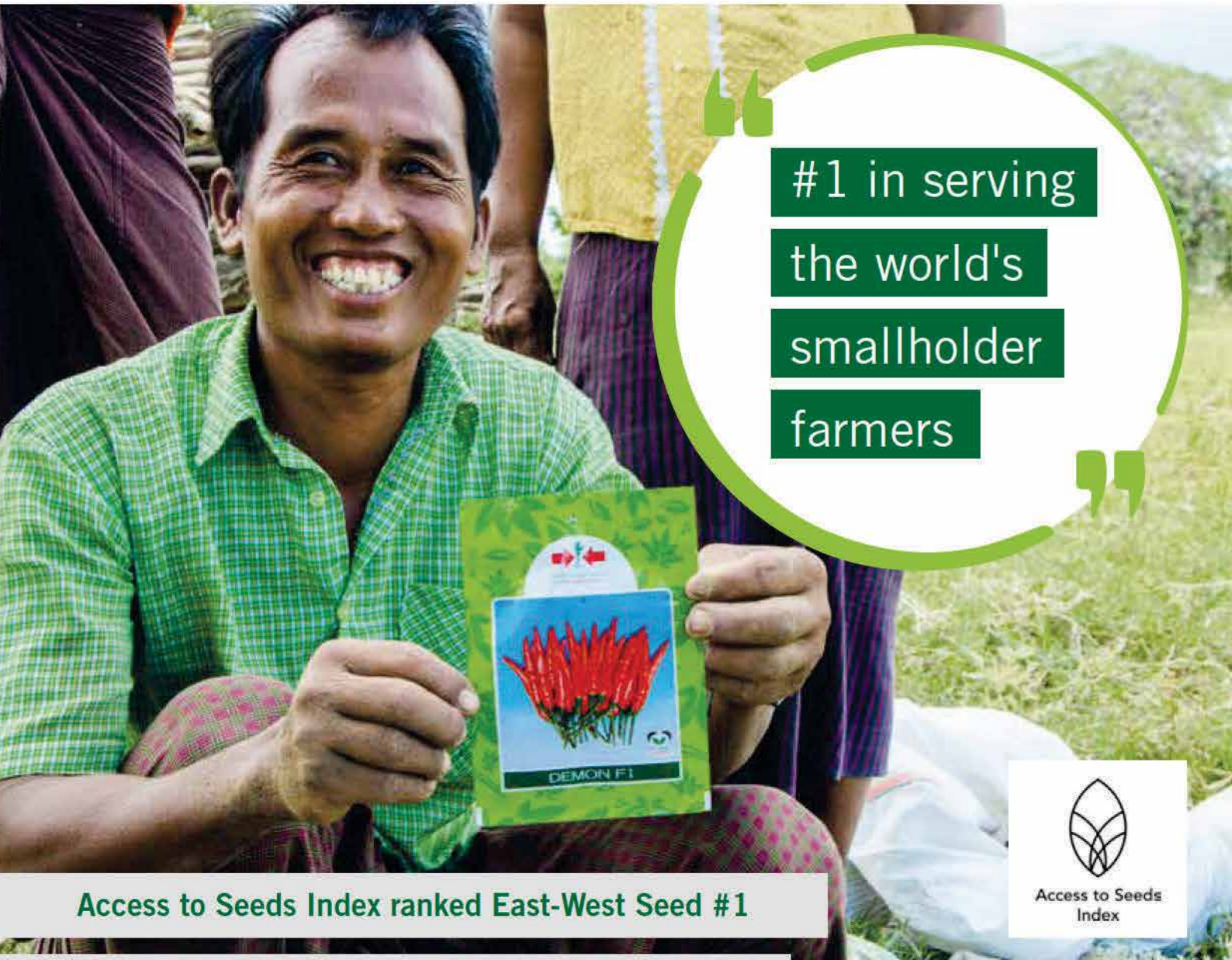


## India & Sri Lanka

Cannabis has long been used in traditional Ayurvedic medicine and has a well-documented history in the sub-continent. Trials for both industrial and medical cannabis were recently approved in several Indian states with more states expected to follow suit this year. Still, unauthorized cultivation, production, possession, usage, trade and transportation of the plant and its derivatives are prohibited under the 1985 Narcotic Drugs and Psychotropic Substances Act. This law specifically discerns between the plant's resin (charas), flower buds (ganja) and seeds and leaves (bhang), explicitly restricting the former two but allowing states to regulate bhang – seeds and leaves are ground and used to make traditional edible preparations, legally sold by licensed shops throughout the country. Ayurvedic cannabis preparations are also used in Sri Lanka, where the government recently announced plans to oversee cannabis cultivation on 100 acres of land aiming for 25 tonnes output a year for both domestic supply and export to North America.







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GrowHow  
Vegetable farming knowledge  
available online

BETTER SEEDS for BETTER YIELD | [www.eastwestseed.com](http://www.eastwestseed.com)



[twitter.com/eastwestseed](https://twitter.com/eastwestseed)



[youtube.com/user/eastwestseed](https://youtube.com/user/eastwestseed)



[facebook.com/eastwestseedgroup](https://facebook.com/eastwestseedgroup)



## Turkey

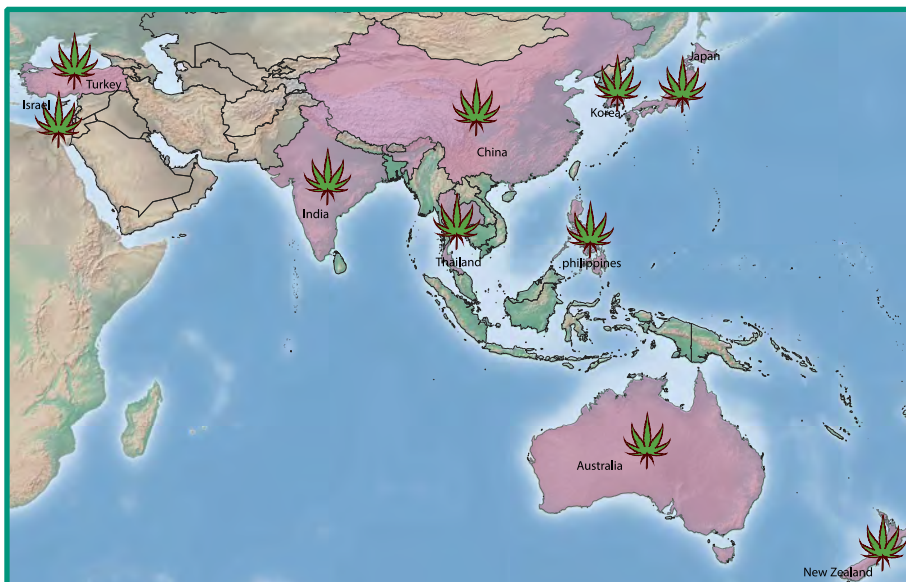
Cannabis may have been cultivated and utilized in 'Anatolia' as far back as 4,000 years ago, and for the first part of the 20<sup>th</sup> century Turkey was a leading producer. After decades of suppressing the industry, the Turkish government is now pushing to revive its position in the world as a leading producer of the plant, with medical and industrial cannabis cultivation now taking place in no less than 19 provinces.



## Australia & New Zealand



Though recreational cannabis remains illegal down under, industrial hemp and medical cannabis are now legal in both Australia and New Zealand. Judging from legislative developments this past year, the two countries' governments may be among the first in the APSA region to decriminalize or outright legalize cannabis for recreational purposes, which is something to monitor in the coming year. Meanwhile, large-scale breeding and production trials for both industrial hemp and potent medical cannabis have been initiated throughout southeast Australia and north New Zealand, where the respective rules, regulations and procedures for cultivation and commerce are transparent, clear and comprehensive.



To access full text summaries by country — including for Israel, Turkey, Australia, New Zealand, Japan, Korea, China, India, Sri Lanka, the Philippines and Thailand — scan the following QR Code:





# Siam's Seed Scholar

## Dr. Papassorn Wattanakulpakin

**Dr. Papassorn Wattanakulpakin, or Dr. Kwan as she is familiarly known, is the head of the Phitsanulok Seed Research and Development Center, Thailand's first and only ISTA-accredited public laboratory. *Asian Seed* recently got to know her a bit during our visit to the lab, which lies roughly halfway between Bangkok and Chiang Mai in Northern Thailand. Our interview covered her background, inspiration, motivations – and more.**

Dr. Kwan was born and raised in Suphanburi, two hours northwest of Bangkok. Though the central Thai province today is a thriving provincial commercial center, it has a longstanding tradition in agriculture, especially rice farming. Indeed, Kwan's grandparents – and their grandparents – were rice farmers.

Kwan's mother, however, was a merchant, trading goods at local markets to support the family. For many in her generation, the perceived hardships of traditional agriculture prompt career paths in other sectors. Nonetheless, Kwan was determined, if not destined, to uphold the tradition of her ancestors. At the very least, agriculture was something she was familiar with, and liked.

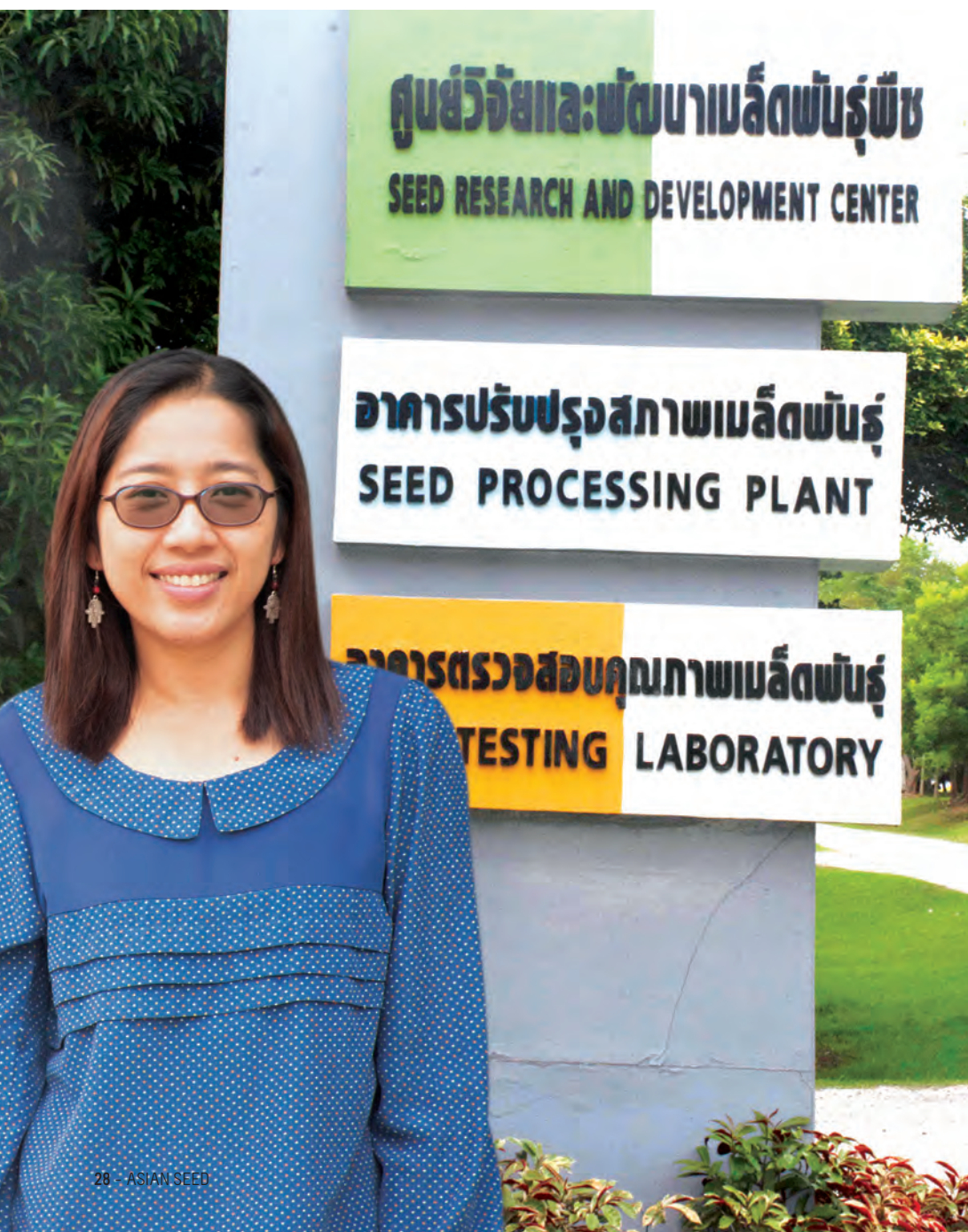
She knew, however, that for such a path to be sustainable in ever-changing Thailand, education would be key. That's why she decided to enroll at the Suranaree University of Technology in Nakhon Ratchasima, where she pursued a Bachelor of Science in Agriculture Technology. It was during her studies there that she realized an interest in seed technology.

"It was during a project involving tissue culture propagation of orchids that I realized I really enjoyed working in the lab and wanted to continue on this path," she recalled.

After graduating, she went on to pursue a Master's of Science in Post-Harvest Technology from King Mongkut's University of Technology Thonburi (KMUTT).

Asked about her inspiration at the time, Dr. Kwan singled out one of her professors, Assoc. Prof. Dr. Songsin Photchanachai, a lecturer in post-harvest technology for seed and grain. "I learned a lot from her.... She encouraged me to continue on the path of seed research. She insisted there would be many opportunities in the future, and she was right."

Kwan's interest soon grew into a hunger for knowledge





and experience, ultimately leading her abroad. Dr. Songsin urged she apply for an exchange student program scholarship to the University of New South Wales in Sydney, Australia focused on paddy-drying using fluidized bed technology.

She was awarded the scholarship. The three-month trip opened her eyes not only to emerging seed technology, but to the world at large. “It was my first time abroad, and I got to learn a lot about different people and society, besides the actual coursework.”

After returning to Thailand, she completed her Master’s Degree and began working at KMUTT as Dr. Songsin’s research assistant – conducting hot water treatment released dormancy of wax gourd seed; researching the effect of piperacea and lemongrass extract on fungal contamination and quality of soybean seed; enhancing chili seed quality with chitosan; and seed priming in maize – on a grant basis.

A few years passed and her hunger for intensive research only grew. She applied for, and was awarded, a government scholarship enabling her to pursue a doctorate degree at KMUTT in biochemical technology.

During this period, Dr. Kwan again had opportunity to study abroad through a program from The Swedish International Development Cooperation Agency (SIDA) and Sweden’s Svalöf Consulting to learn about plant breeding and seed production, with the focus on field crops – especially wheat and corn.

Again she applied, and was awarded the scholarship. She took a brief break from her Ph.D. studies to embark on the two-month, two-phase course abroad, in Sweden and Zambia. In Sweden she learned how that developed country manages breeding and multiplication of staple grains. Zambia was particularly inspirational for Kwan. There, she got a chance to meet Mable Zimwanza, head of the Official Seed Testing Station, Seed Control and Certificate Institute. In Magoye she was especially impressed, during a tour of a local “seed village”, by the effectiveness of villagers’ low-tech methods, storing cowpeas seed in earthen structures to shield seeds inside from the harsh elements outside.

Upon return to Thailand, she completed her Ph.D., and, to fulfill a condition of her scholarship, took a post as lecturer in seed technology with the Faculty of Science at Pranakhorn Rajabhat University in Bangkok.

Though Dr. Kwan got some fulfillment teaching



*“During a project involving tissue culture propagation of orchids I realized I really enjoyed working in the lab and wanted to continue on this path.”*

– Dr. Papassorn Wattanakulpakin



general seed technology, she missed long hours in the laboratory, and yearned for the thrill of conducting intensive research. Then, after serving nearly four years as a lecturer, a new and exciting opportunity arose.

The timing was perfect.

“I was nearing the end of my scholarship obligation, and the new position was a perfect fit for my background and goals. I applied, got accepted and resigned my post as lecturer to start my next chapter in Phitsanulok.”

Her new chapter is no doubt an important one – not only for herself, but for the present and future of Thailand’s seed technology standards. Indeed, as the head of Thailand’s first and only ISTA-accredited public seed testing laboratory, Dr.

Kwan carries a lot of weight and has high expectations to meet.

She successfully set up the Phitsanulok lab to be compliant with strict ISTA standards for initial

accreditation. Thanks to her expertise and leadership, the lab is authorized and equipped to issue ISTA Blue and Orange Certificates for manual sampling, germination, physical purity and determination of other seeds – with a specific scope for vegetables and cereal crop seeds.

The work is only beginning.

As Thailand strives to continue a global leader in quality seed supply through the upgrading and opening of more international-standard facilities, a mountain of work is ahead in terms of technical research and personnel training.

Considering her background, knowledge, experience, and never-ending hunger for knowledge and research, Dr. Kwan is perfect for the position and gives Thailand in the 21st century a strong quality seed advantage.

On page 15 of Asian Seed, Volume 24, Issue 4, there is an article outlining details on the seed laboratory in Phitsanulok, including the ISTA certification process. The issue can be downloaded via [apsaseed.org](http://apsaseed.org) 🌱



# 2019 APSA WorldVeg Vegetable Breeding Consortium Launches

**Registration for the 2019 APSA-WorldVeg Vegetable Breeding Consortium is open now until the end of April.**

**This is the third consecutive year that Asia and Pacific Seed Association (APSA) and the World Vegetable Center (WorldVeg) are offering membership in the Consortium, which focuses on tomato, pepper and cucurbits.**

With membership comes opportunity to interact with WorldVeg researchers, evaluate breeding approaches and discover new avenues of sharing data as advances in biotechnology and genomics accelerate the pace of cultivar development.

All APSA members in good-standing are eligible to join the Consortium, which will commence with its annual workshop at the WorldVeg headquarters in Tainan in May.

Headquartered in Tainan WorldVeg is a non-profit international agricultural research and development center that has formed research partnerships with governmental, non-governmental, and private sector organizations to maintain and exploit vegetable biodiversity. The Center also concentrates on improving vegetable varieties while increasing production, marketing and consumption, especially in the developing world.

Seed companies of any size hoping to remain competitive in turbulent markets will benefit from the latest vegetable breeding research and practical skills in applying new breeding methods that come with Consortium membership. They also gain access to the diverse

collection of vegetable germplasm for which WorldVeg is famous.

During the Consortium's Annual Workshop – a two-day event held in May at the 117-hectare World Vegetable Center, Tainan City – WorldVeg researchers demonstrate new output from their vegetable improvement program. Results obtained by Consortium members who test WorldVeg breeding lines at field sites using the latter's experimental protocols are discussed, and members can participate in presentations on WorldVeg research or review field trials of improved breeding material.

The Consortium grants members one-year lead access (from 1 July until 30 June of the following year) to newly-developed lines shown at the annual workshop, where they can view the preliminary yield trials from which WorldVeg selects entries for their online seed catalog. Consortium members may also have early access to screening protocols or other kinds of scientific information developed at WorldVeg.

Between Workshops, Consortium members receive (once a year) a newsletter

highlighting the latest WorldVeg breeding developments, the Center's Annual Report, along with other news and information about germplasm screening, breeding methods, and WorldVeg breeding lines (sent throughout the year).

Consortium members can request ten free seed acquisitions per year from WorldVeg, subject to availability and phytosanitary clearance.

Last, but not least, Consortium members can participate in collaborative projects with WorldVeg, which uses information gleaned thereby to create breeding programs more relevant to growers. WorldVeg scientists specify traits to be monitored by members and provide experimental protocols.

The Center uses regular feedback from such evaluation trials to improve breeding lines, and works on trait development breeding programs suggested by Consortium members. Data on annual seed sales (in metric tons per variety per year), and information on which traits from WorldVeg were used for each variety, are kept strictly confidential.

**The Consortium membership term is from 1 January to 31 December and deadline for workshop registration is 30 April, 2019. Membership fees are receivable from April 2019:**

**Large Companies (More than 100 employees) ... US\$6900.00 per annum**

**Small Companies (Less than 100 employees) ... US\$2900.00 per annum**

**For inquiries, and to register, please email [kuna@apsaseed.org](mailto:kuna@apsaseed.org)**





# Vegetable Breeding Consortium ANNUAL WORKSHOP

15-16 May 2019 World Vegetable Center Headquarters, Taiwan

The APSA-WorldVeg Vegetable Breeding Consortium Annual Workshop will change the way you do breeding and business:

- Learn about the latest developments in breeding research from the WorldVeg team of internationally renowned plant breeders
- Scout field trials of improved breeding materials to enhance your cultivar catalog
- Meet WorldVeg breeders, scientists and other researchers to strengthen your knowledge network\*
- Field visits to Taiwan seed industry\*\*

14 May (Tue) \*Available for individual meetings, by prior request

15 May (Wed)

Annual workshop (presentation, discussions and field trials observation)

16 May (Thu)

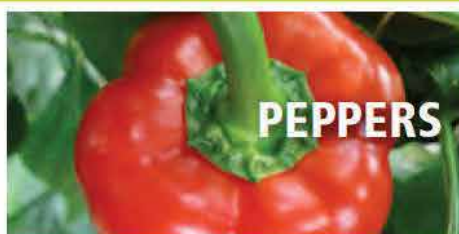
17 May (Fri)

\*Available for individual meetings, by prior request

\*\*Field visits to interact with local seed industry, free of charge and optional, detail program will be announced later, by prior registration



**TOMATOES**



**PEPPERS**



**CUCURBITS**

- 5-10 newly developed dual-purpose tomato lines with TYLCD, bacterial wilt, and other resistances, and some with crimson-old gold or high pigment genes\*
- 12 new dual-purpose and fresh market tomato hybrids with multiple disease resistance under evaluation in a preliminary yield trial (PYT)
- 8 newly-developed lines of hot pepper and sweet pepper (4 each) with multiple disease resistance (hot pepper: *Potato virus Y*, *Phytophthora capsici*, *chili veinal mosaic virus*; sweet pepper: *tomato mosaic virus* and *Ralstonia solanacearum* - bacterial wilt)\*
- 24 previously-released elite lines of hot and heat tolerant sweet pepper (12 of each)\*
- 48 entries of hot and sweet pepper under yield trials with multiple disease resistance
- 6 newly-developed pumpkin (*Cucurbita moschata*) lines with multiple virus resistance and good fruit quality. A demo plot in the field as well as in the net house (artificially inoculated with *Squash leaf curl Philippines virus*) will be available for observing the performance of these pumpkin lines, along with susceptible checks\*

\*Seeds of all these lines are available for distribution on 1 July 2019!

## WHO SHOULD ATTEND?

Participation in the workshop is open only to registered APSA-WorldVeg Vegetable Breeding Consortium companies. Consortium membership includes free workshop participation for one representative from each consortium company, including lodging on the nights of 14-16 May, meals from dinner of 14 May to lunch of 17 May, workshop materials, coffee breaks, and transportation to/from Kaohsiung Airport or Tainan High Speed Rail Station. All Consortium Companies must cover costs of their international travel and Taiwan High Speed Rail (if applicable).

Attendance fee for each additional participant: US\$600.

## Register today!

### APSA-WorldVeg Vegetable Breeding Consortium Annual Workshop

The Asia & Pacific Seed Association (APSA)

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Bangkok 10903, Thailand

Tel: +66-2-940-5464

Fax: +66-2-940-5467

Email: [apsa@apsaseed.org](mailto:apsa@apsaseed.org)

[apsaseed.org](http://apsaseed.org)

# Special Interest Group for Vegetables and Ornamentals (SIG V&O)



A lot of ground was covered in SIG V&O's first meeting of the year. Held on January 25, the meeting started off with members reviewing and providing feedback on the group's technical session at the Asian Seed Congress in Manila last November. It was agreed that speakers would be pre-screened for English-language proficiency, and that APSA would create a presentation template to guide speakers. A motion was agreed for all members to nominate two presentation topics and potential speakers. Selection of topics and speakers will be confirmed by June or July at the latest.

Next, the SIG reviewed activities of its sub-group, the Working Group for Integrated Vegetable Seed Companies or WIC. After reviewing the charter of the WIC, its founding members and their respective roles and responsibilities, it was confirmed that WIC Chair Dr Sumitra Kantrong (Chiatai Group) is in the process of compiling a list standardizing nomenclature with regard to disease-resistance and pests in the APSA region. The WIC is also considering the establishment of a regional entity dedicated to Intellectual Property Rights knowledge, education and protection, which is proposed to be called the Seed Innovation & Protection Initiative or SIPI. This entity would initially focus on knowledge, information and education. It was also confirmed that WIC members will sign a newly-revised

APSA Code of Conduct, which will be in final-revision stage during APSA's midterm meeting (8 – 9 April). To promote understanding of and compliance with the Code, Dr Sumitra proposed that the WIC organize training of trainers (TOTs) curricula, which would help raise awareness among APSA members and cover all issues regarding to breeding, seed production, trading activities and child labor.

The SIG approved a video campaign developed by APSA with direction from the WIC to promote Plant Breeding Innovation (PBI). Three videos, produced in Chinese, English and Japanese, have been published to APSA's website and YouTube channel. (See *page 35 for more information and links*). Moreover, SIG members gave feedback on the latest draft of an IPR and PVP educational poster being developed by APSA with direction from the Standing Committee for Intellectual Property Rights and Biodiversity (see *IPR&BD summary below*). The poster is undergoing revisions and will be presented to members at APSA's midterm in April. The aim is to present all of the campaign material to APSA members at ASC in Kuala Lumpur this November.

The SIG was updated on preparations for the upcoming Asian Solanaceous Round Table III, which is being planned by the SIG V&O's R & D Advisory Group. It was confirmed that the ASRT III will be held

in Bengaluru, India 22 – 24 October 2019, and be jointly organized by APSA, the Indian Council of Agricultural Research (ICAR), Indian Institute of Horticultural Research (IIHR) and the Society for Promotion of Horticulture (SPH). Co-Chair of the R&D Advisory Group, Dr Seetharam Annadana will liaise between APSA and the organizers. An MoU between APSA and ICAR is under consideration.

Updates were given on ongoing and future R&D collaboration with Thailand's National Center for Genetic Engineering and Biotechnology (BIOTEC) and the World Vegetable Center (WorldVeg). BIOTEC has proposed two projects related to Tomato necrotic ring virus (TNRV) and Peanut bud necrosis virus (PBNV). The TNVR project will be in Thailand, the PBNV in India. Proposals will be shared to the R&D advisory committee to review, then circulated for APSA's members participation.

APSA and WorldVeg Breeding Consortium agreement was renewed (See *pp. 30-31 for news*) APSA Executive Director Dr Kanokwan Chodchoey informed the SIG that fees will remain as before; however, there are a few additional benefits for members this year: members can now register two addresses to receive seeds from WorldVeg, compared to one before; and Consortium members are also permitted to establish bilateral and multilateral (breeding project)

agreements with WorldVeg.

Next, the SIG discussed plans for organizing a Study Tour this year, which would be in the scope of breeding and protected cultivation, with focus on low-land protection, plastic covered cultivation and plant architecture.

Five potential countries were nominated: Japan, Israel, the Netherlands, South Africa and Spain.

Finally, the list was narrowed to Spain and Israel. However, both countries pose logistical and timing challenges, and would require at least three-to-four months of planning. APSA will proceed with inquiries to potential partners and organizers and provide an update at the next meeting.

An update was given on APSA's ongoing collaboration with the FAO to survey and analyze regional trends regarding seed laws and regulations in Southeast Asia, with the aim of establishing a common regional seed law. The final draft for APSA's part, which focuses on the private sector, was submitted to the FAO in February. Findings of the study, which include comparative analyses on seed laws and regulatory environments by country will be presented at the ASC 2019 Pre-Congress Workshop in Kuala Lumpur in November.

Finally, the SIG was updated on developments in Myanmar and Vietnam seed industries.



In the former, progress with the recently-formed Myanmar Seed Association, has stalled due to administrative changes in Myanmar, so the approval process may take longer than initially planned. It was recommended

that a representative from another national seed association get involved on a consultancy basis. This proposal will be presented to and considered by APSA's Executive Committee. Also of important note, the Myanmar

government has revised its Pest Risk Analysis rules (See *news on page 14*). Regarding the latter: an informal industry meeting is planned in Vietnam on April 4 and will be attended by APSA representatives. Several leading APSA

companies have expressed interest in attending for preliminary discussions with local representatives of integrated seed companies to discuss trade and IP issues in the country.

## Joint Field Crops Meeting



**SIG Field Crops**  
Chair: Dr P Sateesh Kumar  
Co-Chair: Mr Muhammad Asim Butt



**SIG Hybrid Rice**  
Chair: Dr Frisco Malabanan  
Co-Chair: Mrs Zhu Xiaobo



**SIG Cover Crops**  
Chair: Mr Bhupen Dubey  
Co-Chair: Ms Brenda Dossey



On January 29 members of three Special Interest Groups (SIG Field Crops, SIG Cover Crops and SIG Hybrid Rice) held their first joint-meeting of the year. The first item on the agenda was to discuss proposals for a Study Tour: The first proposal

is for a tour to Vietnam and/or the Philippines with a focus on GM maize and/or hybrid rice. It was determined that the ideal time for both of these crops/countries is September. As a back-up plan, or for 2020, it was proposed to organize a

tour to North America, with a focus on rapeseed (for canola oil). The SIGs also discussed potential speakers and topics for the Asian Seed Congress (ASC), which will need to be confirmed by June. Though the SIGs will plan separate sessions at ASC

to allow for more time, several topics and themes were floated in the joint meeting, including state-of-the-art technology and transfer; hybrid canola breeding and topics specific to the seed industry in Vietnam and Myanmar.

## Standing Committee for Seed Technology (SCST)

The SCST met on January 30. The meeting began with a discussion about strategy and direction for the committee this year and beyond. With regard to feedback and planning for the committee's technical session at the Asian Seed Congress, it was agreed that the annual meeting was not ideal for technology-intensive sessions because ASC delegates are mostly executives and commercial officers as opposed to seed technologists; therefore, it was proposed that the committee organize a separate workshop specifically for

technologists prior to the ASC, and then present the outcome of this session to company executives who attend the ASC technical session. It was proposed that such a workshop be organized in round-table format—similar to those done by Solanaceous and Cucurbitaceous groups. Another comment highlighted the importance of creating a forum focusing on capacity-building for seed companies. It was agreed that the focus of such a workshop should not be limited to seed treatments or priming, for example, and should

emphasize capacity-building and technology transfer. It was suggested that the committee consider consulting and collaborating with the Working Group of Integrated Vegetables & Ornamentals Seed Companies (WIC), which is also planning to organize capacity-building activities related to seed technology, best practices and Intellectual Property Rights (IPR). Specifically,

the WIC would like to focus on technology transfer activities for small- and medium-sized enterprises (SMEs). It was agreed that such a Training of Trainers (TOT) initiative (see *SIGV&O summary*) was in line with the goals of the SCST, and should be planned for September. Nonetheless, the committee will meet with the WIC at the upcoming midterm to determine the next steps.

### SC Seed Technology



Chair: Mr Johan van Asbrouk  
Co-Chair: Dr Manish Patel

# Standing Committee for Trade & Marketing (SC T&M) and Phytosanitary Working Group

The Standing Committee for Trade & Marketing (SC T&M) and members of their sub-committee, the Phytosanitary (Phyto) Working Group held their first meeting of the year on January 30. The meeting began with a review of Study Tours proposed by other APSA groups: APSA's SIG Cover crops, Field Crops and Hybrid Rice are jointly planning a study tour focused on GM maize and hybrid rice agriculture in the Philippines and/or Vietnam (see *joint SIG summary*), while APSA's SIG V&O are considering bringing a group

to Spain or Israel (see *SIG V&O summary*), which would focus on breeding and protected cultivation.

SC T&M suggested APSA look into organizing a Study Tour to Central Asia, e.g. Kazakhstan, Kyrgyzstan or Tajikistan. APSA will explore this possibility. The Phyto Working Group discussed preparations for APSA's 5<sup>th</sup> Phyto Expert Consultation, which is scheduled for August 28 – 29, 2019 in Bangkok. APSA will begin preparing invitation letters for National Plant Protection

Officers (NPPOs). To confirm specific details about the consultation, the Working Group will meet in person at APSA's Midterm Meeting April 8 – 9. The APSA Secretariat will distribute the midterm agenda to members as soon as it's finalized.

Next, SIG T&M discussed potential speakers and topics for the group's technical session at the 26th Asian Seed Congress in Kuala Lumpur, Malaysia this November. One topic proposed regards seed legislation developments

in Malaysia, which is in the process of drafting a new Seed Act. This topic may also be ideal for the ASC Pre-Congress Workshop, which will be themed around Intellectual Property Rights protection. For general trade topics, it was proposed to seek speakers from public and academic sectors, such as the Indian government as well as key regional research organizations such as APAARI. Over the coming weeks, members of the group will nominate specific topics and speakers, to be confirmed by June.



# Standing Committee for Intellectual Property Rights and Biodiversity (SC IPR&BD)

APSA's Standing Committee on Intellectual Property Rights and Biodiversity held their first meeting of the year on February 12. The meeting began with members reviewing last year's agenda and activities, before reconfirming ongoing commitments, priorities and campaigns for promoting knowledge, awareness and understanding of IPR, biodiversity and farmers' rights. Dr Kanokwan Chodchoey informed the SC about the WIC group meeting on April 8 on the first day of APSA's midterm, noting that representatives from APSA's Standing Committees (SCs) and Special Interest Groups

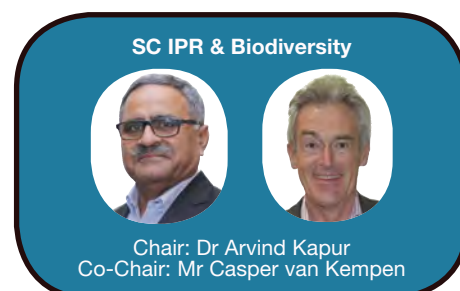
(SIGs) are encouraged to join as observers. The SC confirmed it will convene for a half-day session on April 9, to which members of the WIC would be invited. Several members of the SC confirmed plans to attend both sessions. The SC went on to confirm several agenda items for the upcoming midterm session. It was agreed to revive discussions on APSA's Position Paper on Intellectual Property Rights, aiming to not only raise awareness among members about the paper, but to also gauge its use and application. Also on the agenda will be PVP activity review and discussion. These

include the PVP Forum that APSA organized with the China National Seed Trade Association (CNSTA) in Beijing last October, as well as a Workshop on PVP Enforcement in China, which was jointly organized by CNSTA, Plantum (Netherlands Seed Association) and the Bundesverband Deutscher Pflanzenzüchter or BDP (German Plant Breeders Association) in Beijing in March this year. In addition, the SC is planning a wrap-up session to review the outcome of their Asian Seed Congress workshop in Manila last November regarding the International Treaty on Plant Genetic Resources for Food

and Agriculture (ITPGRFA).

The midterm session will also discuss updates to this treaty's modified sections on Digital Sequencing Information (DSI) and farmer rights. A new workshop on the treaty will be planned for this year's Asian Seed Congress in Kuala Lumpur, Malaysia.

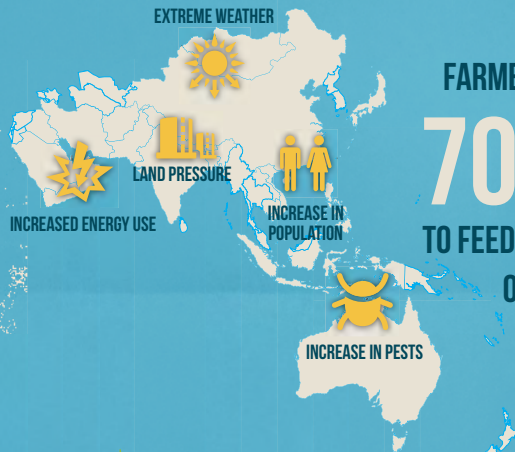
Finally, members began discussing plans for speakers and topics for the SC's ASC 2019 technical session this November. A list of potential topics and speakers will be drafted after the midterm meeting and should be finalized by June/July.





# PLANT BREEDING INNOVATION

Meeting the challenges of global agriculture

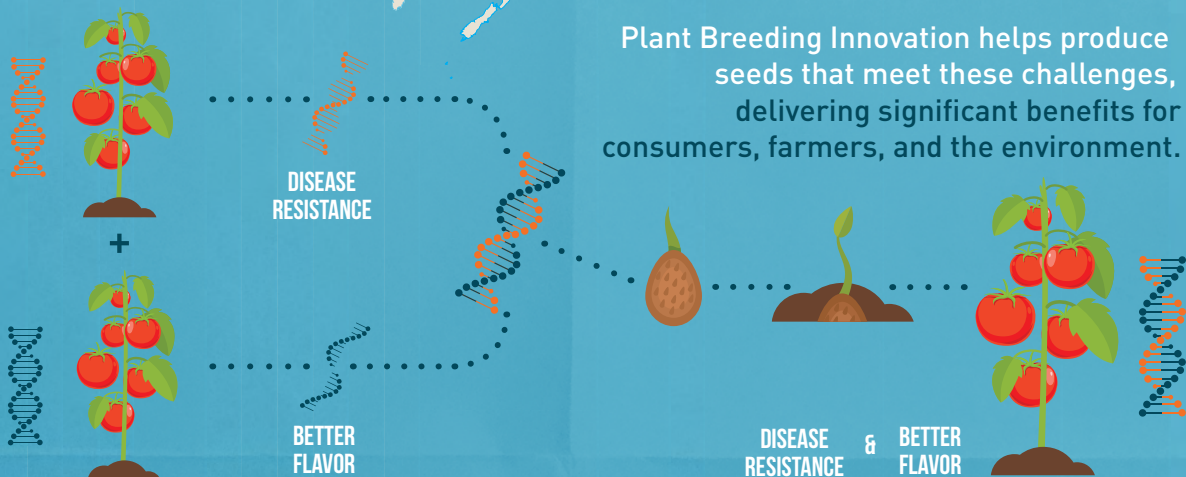


FARMERS WILL NEED TO PRODUCE  
**70% MORE**  
TO FEED THIS GROWING WORLD AND  
OVERCOME A CONTINUOUSLY  
CHANGING ENVIRONMENT

## PLANT BREEDING INNOVATION DEFINED

Plant breeding innovation is the term to describe the constantly evolving ideas and practices which enhance the field of plant breeding. Plant breeding innovation is based on the same seed improvement principles that farmers and plant scientists have used for thousands of years. Breeding tools are continually evolving due to our increased understanding of plant physiology, molecular biology, and genetics.

Plant Breeding Innovation helps produce seeds that meet these challenges, delivering significant benefits for consumers, farmers, and the environment.



## Innovation in Plant Breeding Brings Benefits

### FARMER

- More abundant and reliable harvests
- Profitability, stable income, and enhanced quality of life
- Quicker and continuous access to improved seed

### CONSUMER

- Food security
- Diverse and balanced diet
- Foods with enhanced taste and nutrition

### THE ENVIRONMENT

- More food from same land
- Decreased greenhouse gas emissions
- Preservation of natural habitats
- Reduced soil erosion

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THE ASIA & PACIFIC  
SEED ASSOCIATION

APSASEED.ORG

Introduction to PBI  
Videos: English,  
Chinese and Japanese

The APSA Secretariat has produced videos in three key languages introducing the benefits of new breeding techniques. To watch the videos, scan the QR Code to the right, or type in this url:

<https://tinyurl.com/intro-to-pbi>



# Meet APSA's New ICT Officer

## From Bombs and Refugees to Worms, Riceberry and now Seeds

**Visavesa Chuaysiri, who goes by the nicknames of “Pooh” in Thai, and “Jerry” in English, joined the APSA Secretary in February as Information and Communications Technology Officer. In this new role, Visavesa will work closely with APSA Communication Manager Steven Layne in the production and dissemination of print and digital publications, graphics and multimedia, including *Asian Seed Magazine*. He will also coordinate and advise on internal data and networking technologies while helping to maintain APSA's website. Here *Asian Seed* speaks with Jerry about his interesting background.**

### **Tell us about yourself – your background and previous experience.**

I was born in Thailand's Northeastern Yasothon Province but moved to Bangkok around age 13. I have one elder brother. Graduating in 1997 from agriculture-oriented Kasetsart University, in the Faculty of Humanities, with a Bachelor of Arts degree, I started working as a graphic designer in publishing.

In the year 2000 I had a chance to join the Norwegian People's Aid/Thailand Mine Action Center Humanitarian Mine Action Project (HMA), which surveys the impact of landmines and explosive war remnants in provinces along Thailand's border with neighboring countries.

It was like a starting point – to change my view of the world.

I worked on the HMA continuously, in association with various organizations, until 2018 when I was with the Thai Civilian Deminer Association, a group that clears unexploded land mines. This work brought me to key border areas with all of Thailand's neighbors, including Malaysia, Cambodia, Laos and Myanmar.

My work in HMA operations gave me access to areas sensitive or critical to national security where not everybody has access: I found a lot of people in border zones suffering from the impact of mines and explosive remnants of war (ERW). In 2001, a survey showed more than 554,000 people impacted. Now approximately 120,000 remain in the whole country.

What I loved about work with the HMA was having gainful employment while alleviating suffering and helping others. It was a special experience, and is

still a big influence on my point of view and thinking. It also afforded good opportunity to hone my IT skills as I was deeply involved in Information Management.

I hope such skills are a good fit for APSA, and that I'll be useful here in the same way.

### **Why did you decide to work for APSA? What do you hope to gain here, and what do you think you will bring to the association?**

I am interested in seed: I started my own riceberry farm in 2015 upcountry and soon after started farming earthworms at my home in Bangkok.

Since APSA works with seed companies, government agencies, and all seed stakeholders, I see that as an indirect way to help people's food security. I think my experience and skills are in line with what APSA needs to achieve the association goals.

### **What do you think about seeds, vegetables, crops and breeding?**

Seed is one of the most important things for the human race in my view – like a starting point for civilization. Humans don't need to migrate or hunt when they know seed, and how to breed and grow crops. The agricultural revolution was a great advance in the history of Homo Sapiens. After that we could settle down and have time to think about development instead of all the time looking for food. As a result, we developed tools, architecture, culture and many, many things.

Air and water are the most immediately essential things to life, but food comes next. So seeds – whence come vegetables, field crops, and the animal

feed necessary for raising beef and poultry – are at the core of human food production.

Rice is one type of seed grain – and I still eat rice every day.

### **What are your hobbies, passions and special interests?**

I am interested in various hobbies, hitherto mainly outdoor activities such as trekking, cycling or running, but recently – over the last four or five years – organic farming has become my special interest. I started an earthworm farm in 2016 and spend my weekends with the earthworms: I harvest vermicompost for my riceberry field to reduce costs.

### **What are your goals and ambitions, personally and professionally?**

To do my best in my role. I work to increase my IT skills continuously as the technology changes fast, and some things I used to do two or three years ago don't work with current computer systems. New technology, techniques, knowledge and skills help one to understand and manage what is appropriate – for one's self and for the organization.

Personally, I plan to expand my farm: put it on a bigger scale, gain enough income so that it stands on its own. Then I can share the knowledge I derive from this farm with local people – and anyone else interested in growing their own!





# KL: ASC 2019 Preparations Underway

Planning and preparation have commenced for the 26th Asian Seed Congress, which will be held 25 – 29 November, 2019 in the Malaysian capital.

A team from the APSA Secretariat on January 22 met with representatives from the National Seed Association of Malaysia (NSAM), who will lead the National Organizing Committee (NOC) of APSA's annual flagship event.

Held at NSAM's Office in Universiti Putra Malaysia, the meeting was the first of a series of NOC planning meetings scheduled over the next few months.



Representatives of NSAM met with APSA on January 22 to discuss preparations for ASC 2019.

Details about the venue, schedule, roles and duties were discussed while the NOC and APSA also brainstormed ways to ensure this year's Congress is unique,

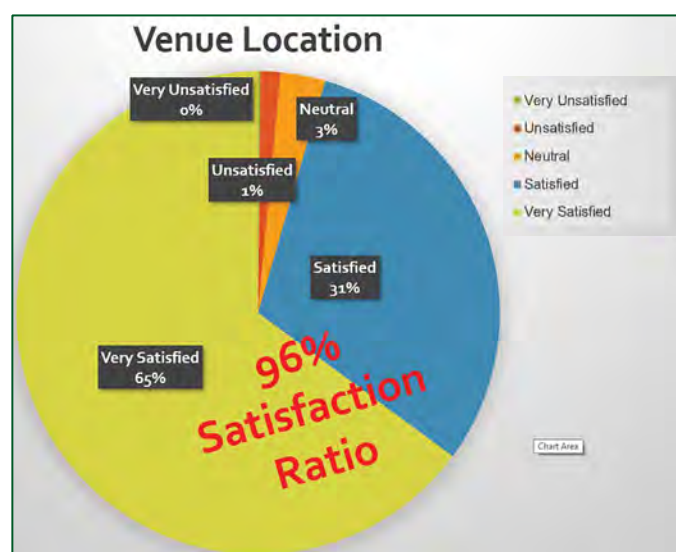
entertaining and memorable. This year's Congress will be hosted at the Kuala Lumpur Convention Centre, located in the heart of the Kuala Lumpur

City Centre (KLCC). Malaysia has previously hosted the Asian Seed Congress once before, when Kuala Lumpur was the host in 2006.

## Asian Seed Congress 2018 Gets 82 Percent Satisfaction Rating

Surveyed delegates who attended the 25<sup>th</sup> Asian Seed Congress – which was held last November in Manila, the Philippines – gave the premier seed industry event an overall satisfaction rating of 82.3 %. Delegates were surveyed by the APSA Secretariat about the meeting following its conclusion and rated it using a five-point scale:

- Very Unsatisfied: 1 point
- Unsatisfied: 2 Points
- Neutral: 3 Points
- Satisfied: 4 Points
- Very Satisfied: 5 Points



The Philippines always proves to be a popular venue for the Asian Seed Congress, and the 25<sup>th</sup> edition in Manila was no exception. For full results and presentation, please email Mike@apsaseed.org

Delegates rated the following aspects of the event.

- Venue Location
- Hotel
- Food & Dining Options
- Registration
- Exhibition Space
- Trading Tables
- Meeting Rooms
- Technical Sessions
- Cultural Performances and Entertainment
- Accompanying Persons Tour
- Inaugural Ceremony
- Welcome Cocktail Party
- General Assembly Meeting
- Gala Dinner
- Post Congress Tour

The points were weighted, tallied and averaged using standard statistical analysis. A total of 135 respondents completed the survey, which represents a sample size of roughly 10%.

The margin of error for this sample at the 95% confidence level is +/- 8 percentage points.

## Bengaluru Beckons for Third Asian Solanaceous Round Table in October

The third "Asian Solanaceous Round Table (ASRT3)" is planned to be held 22-25 October in Bengaluru, or Bangalore. APSA Executive Director, Dr. Kanokwan Chodchoey and Event Manager Mike Kingpayom went to the southern Indian city in February to meet with Indian associates and discuss preparations for the event.

Born in Bangalore, the first ASRT was held in 2014 launched as a platform for scientists from both public and private sectors to work on public-private partnership (PPP) in finding solutions for the farmers' problems in the Asian region, focusing on the solanaceous family of vegetables, primarily tomato, pepper and eggplant.

A follow-up round table (ASRT2) was held in Bangkok in 2017. Stay tuned for more updates, which will be announced when confirmed.



From Left: Dr. Seetharam Annadana (APSA R&D Advisory Committee Co-Chair); Dr. A.T. Sadashiva (Principal Scientist and Head Division of Vegetable Crops at ICAR-IIHR); Dr. M.R. Dinesh (Director, ICAR-IIHR); Dr. Kanokwan Chodchoey (APSA Director) and Mr. Mike Kingpayom (APSA Event Manager).

# 2019 CALENDAR: QUARTER TWO

DATE	MEETING / EVENT / OCCASION	VENUE
31 Mar - 1 Apr	China National Seed Congress (organized by CNSA)	China
8-9 Apr	APSA Midterm Meeting	Bangkok, Thailand
13 April	Songkran and Khmer New Year	Thailand and Cambodia
14 April	Lao New Year and Sinhala, Tamil New Year	Laos and Sri Lanka
17 April	Myanmar New Year	Myanmar
21 April	Easter Sunday	The West
17 April-10 May	11th China (Shouguang) International Facility Vegetable Variety Exhibition	Shouguang, China
1 May	International Labor Day	Worldwide
5 May	Ramadan begins	Islam
9 May	Yom'Ha'atzmaut	Israel
15-17 May	APSA-WorldVeg Annual Workshop	Tainan, Chinese Taipei
25 May	Jordan Independence Day	Jordan
29 May	Ganatantra Diwas	Nepal
4 June	Ramadan ends	Islam
3-5 June	ISF World Seed Congress	Nice, France
12 June	Araw ng Kasarinlan	the Philippines
15-19 Jun	ASTA's inaugural Policy & Leadership Development Conference	Denver, USA
24-27 June	Agrisrael 4.0	Israel
26 Jun - 3 Jul	32nd ISTA Congress	Hyderabad, India



# Asian Seed Magazine 2019 Advertising Rates

Magazine Formats & Rates (US\$)	A la Carte		Seedling Package (two issues)*		
	No. 1-3	No. 4	Special Rate	Value	save
Centerfold: 420x297mm ( +5mm bleed)	2,720	2,992	4,896	5,440	544
Full Spread: 420x297mm ( +5mm bleed)	2,320	2,552	4,176	4,640	464
Back Cover: 210x297mm ( +5mm bleed)	2,320	2,552	4,176	4,640	464
Inside Front Cover: 210 x 297mm ( +5mm bleed)	1,760	1,936	3,168	3,520	352
Inside Back Cover: 210x297mm ( +5mm bleed)	1,632	1,795	2,938	3,264	326
Full Page -- right: 210x297mm ( +5mm bleed)	1,440	1,584	2,592	2,880	288
Full Page -- left: 210x297mm ( +5mm bleed)	1,280	1,408	2,304	2,560	256
Half page -- right: 210x148mm ( +5mm bleed)	816	898	1,469	1,632	163
Half page -- left: 210x148mm ( +5mm bleed)	736	810	1,325	1,472	147
Quarter page -- bottom full width left: 210x74mm( +5mm bleed)	520	572	936	1,040	104
Quarter page -- bottom full width right: 210x74mm ( +5mm bleed)	480	528	864	960	96
Quarter page -- bottom right: 105x148mm ( +5mm bleed)	440	484	792	880	88
Quarter page -- bottom left: 105x148mm ( +5mm bleed)	400	440	720	800	80
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Advertorial in Magazine half page	900	1,000	Free x 1 **		
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Add on: promotion of advertorial on social media	50****		Free x 1		
Add on: promotion of advertorial on newsletter	50*****		Free x 1		
Add on: Custom Digital Marketing Campaign	Contact US				
APSA 2019 Calendar Promotion (For Package Bookings Only)					
APSA Calendar One Month: 200x190mm + 200x40mm	1500		Special Rate	Value	save
			1,200	1,500	300

\* Choose two issues from 1, 2 and 3

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**Magazine trim size:** 210 x 297 mm

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