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An Agricultural Pest Few Know About

Throughout the 2000s the author conducted research and experiments regarding development of innovative pest control methods to be directed against a little-known invasive soybean pest species in Japan. . The study started with basic research on the potential speciation stimulated by host plants. The study then ranged from: 1. confirmation of local adaptability and pest resistance on the genetically modified (GM) soybean, 2. development of an index to evaluate and select insect-resistance varieties introduced from Asian Vegetable Research & Development Center (AVRDC), Taiwan. 3. plant histomorphological resistance analysis of plants, 4. measurement of pest control effects of seed covering with phenyl-pyrazole insecticide, applied through seed coating and soil injection methods.

Dectes stem borer (*Dectes texanus* LeConte) is the larvae of Coleoptera, Cerambycid beetles and originated in the US and are distributed across North America's Great Plains, east of the Rocky Mountains to the Mississippi River. Its native wild hosts are of the family Asteraceae including cocklebur (*Xanthium strumarium*) and ragweeds (*Ambrosia spp.*). Commercial sunflower (*Helianthus annuus*) is also infested by the Dectes stem borer.

Dectes stem borer is recognized as a potential threat to soybean (*Glycine max*) production in North America. A 10% reduction in seed weight may result from the plant physiological losses when damaged by "stem tunneling," but most yield loss occurs from the opportunity loss of machine harvesting caused by "plant lodging." During July and August, larvae hatched from eggs laid on the petiole pith, soon move to the main stem and stay about six months in the plant body. When soybean on the field starts drying, the larva girdles (scraping plant tissue girdle-like inside the stem) the inside the main stem near ground level, makes an overwintering chamber where it remains in pupae form in the plant residue.

Cannibalism left only one larva surviving in a plant stem

Soybean production in North America is generally done by leaving the plant in the field to dry and then harvesting it mechanically. The inside of the soybean plant is girdled and filled with feces, so it easily falls over ("lodging") in rain or strong winds at the girdled point, making it impossible to harvest mechanically.

Conventional pest control measures involved spraying pyrethroid insecticide and removing and/or plowing plant residues as cultural control . However, the larvae spend almost all of their livesinside the plant and its residues, making it difficult to apply contact chemical insecticides. Also, soybean producers prefer leaving plant residues on the fields until the next production season because of soil conservation with less plowing and to save fuel cost.

Overwintering chamber is built near ground level

Several results and findings from the research and experiments have contributed further development and modification of pest control methods against the Dectes stem borer. On the other hand, several researches revealed that there were statistically significant differences on the machine harvested yield between non-lodged plant (treated) and lodged plant (un-treated) plots, however it found no significant difference in the physiological yield losses between both treatment plots.

I had some kinds of strange and odd feeling that the reason why Dectes stem borer was recognized as a soybean pest depended on the production methods (in this case, it was harvesting method), but not on the physiological pest damage which in general, are the major reason of yield reduction.

(August 2023, Niide)

‘Towards the 21st Century’ Revisited <Part 6>

Conclusion

In the past, we discussed "coexistence of nature and humans," "affluence," and "ways of life" in two series featured in AAINews. Twenty years have passed, and issues stemming from globalization and capitalism appear to have only intensified. In this series, we have revisited these themes through concrete examples of activities in which AAI members and former members were involved, focusing on approaches to regional development including environmental issues, and considering sustainable societies and lifestyles.

In the case of the Universal Agriculture Initiative in Fukuroi City, Shizuoka Prefecture, efforts focused on creating a feasible framework within the community. This connected elderly and disabled individuals seeking social participation and employment with the agricultural sector, which is facing challenges such as an aging population, a lack of successors, and an increase in abandoned farmland. One retired AAI member's activities in Miyazaki Prefecture focused on local revitalization through firefly breeding, which aimed to protect the environment and create new value for the region while engaging with local residents. In Mito City, Ibaraki Prefecture, a former member documented his effort to transit into fruit farming, highlighting struggles and insights gained gradual understanding gained from interactions with senior farmers. Meanwhile, the Sakae Furusato Vegetable Garden Project in Tsukuba City showed that while small in scale, the initiative fostered sustained interaction both within and outside the community.

These initiatives were not started by us alone but were based on activities initiated by local welfare facilities, NGOs, and municipal governments. Many local governments and residents share a sense of urgency about addressing issues such as environmental impacts and regional community challenges, recognizing that these are not reflected in efficiency-driven economic evaluations. Each of these actors has started working within their limited human and financial resources.

Through our involvement in these activities, we have encountered new challenges and social issues. In the case of the Sakae Furusato Vegetable Garden, it became clear that the region's disengagement from agriculture had progressed more than expected, highlighting the challenges of finding successors to sustain agricultural activities in the region. On the other hand, the experience of a Regional Revitalization Cooperation Team member, who was expected to become a leader in local agriculture, exposed the paradoxical reality that, despite such expectations, securing farmland for agricultural inheritance is difficult. Additionally, the observation from the Miyazaki firefly case, that "relationships unique to rural areas are deeply intertwined with local economies and culture" is particularly insightful, highlighting the difficulties faced by outsiders or those who have been away for a long time when trying to engage in local activities.

In international technical cooperation, environmental conservation and community sustainability are critical themes, but Japan's challenges seem even more severe. Abandoned farmland, while no longer in use, remains classified as agricultural land. While the number of farmers is decreasing and the population is aging, there are still people with the will to continue farming. If this abandoned farmland is no longer recognized as farmland, and if there are no people left in rural areas who can call themselves farmers, it will be impossible to regain what is lost. Just thinking about it is terrifying. Now is the time to take action, and we, as AAI, want to expand our opportunities to apply the lessons from overseas to promote agriculture and rural revitalization within Japan.

In this series, we have introduced four initiatives closely related to AAI. While working on these small-scale, community-based activities is meaningful, it is also true that there are limits to what can be achieved by such efforts alone. To transform these grassroots activities into a larger force, an objective and broad perspective is needed. The necessary legal reforms and governmental-level initiatives cannot be developed only by local efforts. However, there are mechanisms and innovations that can be implemented at the local level. We, too, must always maintain a sense of discipline, ensuring that we do not become self-satisfied with our small-scale activities.

Reflecting on these activities compared to 20 years ago, I believe we have made some progress. Moving forward, it is essential to continue developing our efforts into ones that are socially significant.

Useful plants in Sudan <Part 7>

The Three Faces of Tamarind

Tamarind (*Tamarindus L.*) is an evergreen tall tree of the legume family, and according to the Heibonsha World Encyclopedia of Useful Plants (1989), it is native to Africa and is a monotypic genus with only one species. Tamarind is collectively called "Aladeep" in Sudan, but it shows different faces as a useful plant. In this article, I would like to describe the three faces of tamarind confirmed in Sudan, which is considered as a minor crop in Japan, and introduce how it is used in Sudanto.

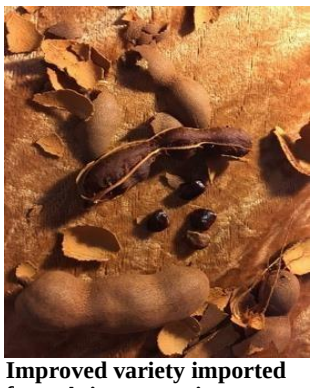
The first face of tamarind is as a standard product in a traditional dried goods store. In Sudan, due to the dry climate, various sun-dried goods are sold. Tamarind pods are displayed in the store along with other dried goods such as beans, various spices, tomatoes, hibiscus, ginger, and baobab seeds. The tamarind in this dried goods store is sold with the pods stuck together in a complex manner, and at first glance, it does not at all resemble the image of tamarind as a cultivated plant. However, this is probably the original form of this plant in Africa. The first way to use tamarind is as a juice ingredient, soaked in water and boiled in the same way as the baobab seeds mentioned above, and drunk. It is a refreshing soft drink with a slight sweetness and sourness. However, although this first face is a regular item at dried food stores, I have never seen it actually cultivated in northeastern Sudan.

Original Tamarind

The second face is cultivation as a hedge to prevent livestock from invading farmland in rural areas, and this type is actually planted in irrigation schemes in River Nile State. A similar fence material is mesquite, a legume introduced in the previous article in this series, which has thorny branches and is used as a natural hedge. However, mesquite has the risk of escaping from human control and spreading into the surrounding area due to its vigorous seed reproduction ecology. Therefore, the safest way to use it is to bundle up the stems and branches after cutting, and pile them up to create an artificial fence. On the other hand, tamarind grows and develops at the same rate as mesquite, but the planting process is more easily calculated, and it is mainly used as a hedge. These hedge tamarinds also produce red pods in May, which become a snack for village children, and are sold in the market as seasonal fresh tamarinds.

Tamarinds used as a hedge

The third face is the imported tamarind. Tamarind is said to have originated in Africa, spread to Asia, and was improved in India and developed into an edible variety. This cultivated tamarind was then re-imported to Sudan and sold in boxes in supermarkets. This is the third face seen in Sudan. The tamarind in this supermarket looks so different from the first face in the dried goods store that it is hard to believe it is the same plant, and it gives a very refined impression.



Improved variety imported from Asian countries.

Now, even though the second face of tamarind, which is used for hedges, is also eaten raw, the amateur eye does not immediately think that they are the same species from the first and third faces, in terms of fruit morphology. However, all the seeds from the first to the third face are identical. Tamarind is a mysterious plant that has many faces, but in the end, it is undeniably the same monotypic genus in taxonomic terms.

AAI and Myself – Shuichi Matsushima -

Reaffirming AAI's dreams and reality as a farewell

AAI News is a private journal that provides real-time technical knowledge and views on the agricultural and development fields to those with connections with AAI, based on the current activities of our company.

AAI's articles are a one-way message from us, and sometimes they may not be fully thought through sufficiently scrutinized before release. However, AAI News readers have been tolerant and warm in their support of our activities, and many have sent encouraging feedback. We are grateful for this direct connection with all of you.

While we are connected through the AAI News, one thought has crossed my mind, “Are our readers fully aware of who we, the publishers of the news, are?” Indeed, while we have been continuously delivering information about technical events and our perspectives, perhaps we have not covered much about ourselves. So here, I would like to take a moment to reintroduce and update you on AAI.

AAI is publicly recognized as an agricultural technology consulting firm. As you may gain a general understanding of AAI as a consulting firm from our website and other resources, it is based in Machida City in Tokyo, and provides assistance to agriculture development and agriculture techniques to developing countries and their people. In general terms, a company is often viewed as an “economic entity that conducts business activities by combining and concentrating various resources to pursue profit.” Likewise, a consultant is commonly understood as an “individual or organization that assists clients in solving their specific issues and challenges by utilizing their skills and experiences.” From that, most people would imagine “AAI may be a group of smart professionals swiftly performing their consulting duties”. However, AAI's actual approach diverges somewhat from this typical image.

Since its founding in December 1984, AAI has fostered a company culture that values the pursuit of technical interests and interaction with like-minded colleagues. Our working style is also rather unique. In AAI’s company profile, we emphasize a “field-oriented approach,” but this does not simply mean striving to be “highly proactive consultants.” Instead, it embodies the philosophy of “Consulting without reality is worthless.” These words express a strong commitment to never losing interest in natural and social phenomena, even while taking on the role of a consultant. Consulting work tends to be a one-off, outsider type of work, but these words serve as a warning to us never to do that. As a company, AAI is somewhat unconventional in that we have never set performance targets since our establishment and we are not particularly driven by profit motives. In short, our AAI is a small gathering of people who share a strong interest and passion for agricultural technology, and we enjoy satisfying our technical curiosity and expanding our circle of like-minded people.

The author of this article, Matsushima, will be leaving AAI this June. As my final role here, I have been assigned to write this AAI News article, and I struggled greatly with selecting the content. However, as a farewell, I would like to take this opportunity to once again present the true picture of AAI from an insider's perspective. To all our readers, I sincerely hope this provides renewed insight into AAI’s journey and present reality, and I kindly ask for your continued warm support as AAI moves forward with a fresh spirit and new energy.

In our bustling, cluttered office space, colleagues are cheerfully engaged in their work once again today