Innovative, Productive Permaculture

Ali Riza Ersoy

Productivity *Insights* Vol. 2-8

Asian Productivity Organization

The Asian Productivity Organization (APO) is an intergovernmental organization that promotes productivity as a key enabler for socioeconomic development and organizational and enterprise growth. It promotes productivity improvement tools, techniques, and methodologies; supports the National Productivity Organizations of its members; conducts research on productivity trends; and disseminates productivity information, analyses, and data. The APO was established in 1961 and comprises 21 members.

APO Members

Bangladesh, Cambodia, Republic of China, Fiji, Hong Kong, India, Indonesia, Islamic Republic of Iran, Japan, Republic of Korea, Lao PDR, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Turkiye, and Vietnam.

Vol. 2-8

Innovative, Productive Permaculture

SEPTEMBER 2022 | ASIAN PRODUCTIVITY ORGANIZATION

PRODUCTIVITY INSIGHTS Vol. 2-8
Innovative, Productive Permaculture

Mr. Ali Riza Ersoy wrote this publication.

First edition published in Japan
by the Asian Productivity Organization
1-24-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
www.apo-tokyo.org

Designed by Convert To Curves Media

CONTENTS

PREFACE

The P-Insights, short for "Productivity Insights," is an extension of the Productivity Talk (P-Talk) series, which is a flagship program under the APO Secretariat's digital information initiative. Born out of both necessity and creativity under the prolonged COVID-19 pandemic, the interactive, livestreamed P-Talks bring practitioners, experts, policymakers, and ordinary citizens from all walks of life with a passion for productivity to share their experience, views, and practical tips on productivity improvement.

With speakers from every corner of the world, the P-Talks effectively convey productivity information to APO member countries and beyond. However, it was recognized that many of the P-Talk speakers had much more to offer beyond the 60-minute presentations and Q&A sessions that are the hallmarks of the series. To take full advantage of their broad knowledge and expertise, some were invited to elaborate on their P-Talks, resulting in this publication. It is hoped that the P-Insights will give readers a deeper understanding of the practices and applications of productivity as they are evolving during the pandemic and being adapted to meet different needs in the anticipated new normal.

BACKGROUND

In 2017, at the age of 60, I retired from one of the world's oldest and largest technology companies where I had worked for more than 30 years in electronics engineering. Since I was born in a village, I was certain that I wanted to return to a farming life but did not know what type of agriculture I wanted to be involved in. After being introduced to the concept of permaculture when conducting research in the previous decade, I was immediately attracted by it. Around that time, I attended an organic agriculture seminar where I met Esra Karagoz, an agricultural engineer studying to become an industrial engineer who was involved in permaculture studies.

Subsequently, Karagoz and I jointly purchased land and then met Umit Demirtas, a retired literature teacher and inhabitant of the village I moved to. We established a vineyard operated in line with permaculture principles. The Agriculture 4.0 wave had begun, and we decided to combine the approaches of permaculture and Agriculture 4.0, which was a novel concept in early 2021. We referred to it as "PermAgro 4.0." Permaculture enthusiasts are generally slightly romantic and uncomfortable with technology. On the other hand, technology enthusiasts have usually never heard of permaculture. We began by testing the first Agriculture 4.0 devices on our farm and gradually speeded up their adoption.

This P-Innovator report introduces the concept and progress of PermAgro 4.0 in the hope of inspiring others working to make our planet more sustainable for future generations.

WHAT IS PERMACULTURE?

Permaculture is a set of combined agricultural practices in which "perma" obviously refers to "permanent" and "culture" to "agriculture." The principles were developed in the 1970s by Bill Mollison and David Holmgren (1978) [1] with the key concepts of "respect nature," "imitate nature," "forests are our best guides," "beliefs and ethnic origins are not important," and "follow the principles of nature." The concept also acknowledges that enormous natural diversity exists, everything is interrelated, nothing continues in the same state indefinitely, basic ethical principles are universal, we all have a responsibility to care for our planet and its people, and everyone deserves a fair share of earth's bounty. The advantages of this viewpoint are synchronized information; rapid, efficient, flexible, resource optimization; setting of zero-error targets; greater physical and psychological well-being; a focus on strategic strengths in agriculture; and increased employment opportunities in agriculture, especially for younger people with agrotechnological backgrounds.

Agrifood systems currently face many challenges that reflect the misdistribution of inputs such as labor, resources, and capital. Some of those challenges are international competition; increasing populations and imbalances in population density; decreased profitability and efficiency; global warming and climate change; aging of the agricultural labor force; loss of fertile land; nonagricultural uses of plant products as fuel; loss of topsoil; deforestation; air, water, and soil pollution; waste and losses in production and supply chains; failures in resource management and optimization; extensive monoculture; increases in crop diseases and pests; famines resulting from political upheavals and wars; etc. It appears that new frameworks are needed.

Permaculture is one solution to those challenges. It is basically a methodology to design ethical, sustainable human settlements and agricultural areas to allow plants, animals, and people to flourish in the surrounding natural environment. The ultimate goal is to create co-existing production sites and residential areas that are easy to maintain, stable, and self-sufficient over the long term. In Turkiye, permaculture courses were introduced in educational curricula in 2009. It is estimated that 2,000 persons have now participated in various forms of related training, and permaculture practices are being implemented on more than 30 farms of various sizes, particularly on the west coast. These numbers continue to increase rapidly.

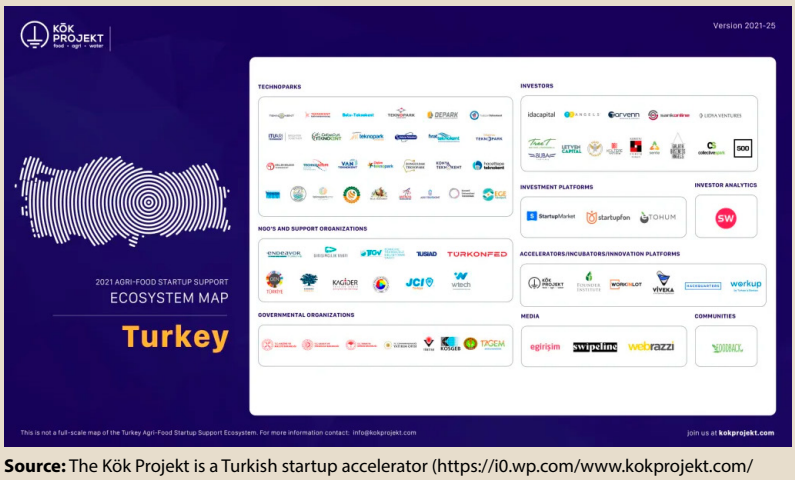
WHAT IS AGRICULTURE 4.0?

Human domestication of plants and animals after the establishment of permanent settlements almost 12,000 years ago may be referred to as the 1st Agricultural Revolution. The period 700–1800 BC marked the 2nd Agricultural Revolution when the sector was commercialized. The period between 1800 BC and 2000 AD saw the development of intensive agricultural production practices. After 2000, various trends have been united under the term "Agriculture 4.0," including "smart agriculture," "precision farming," etc. They generally refer to the digitalization of agriculture, similar to the case of digitalization in manufacturing.

Agriculture 4.0 uses digital technologies to increase the efficiency and quality of crop production. Information and capital are critical elements. Smart agriculture represents knowledge-based production incorporating the management of heterogeneous natural elements. According to research conducted by McKinsey & Company, agricultural connectivity could unlock more than USD500 billion in GDP by 2030 [2]. Digital technologies are the main enablers of this growth.

FIGURE 1

2021 TURKISH AGRIFOOD STARTUP SUPPORT ECOSYSTEM MAP.



Source: The Kök Projekt is a Turkish startup accelerator (https://i0.wp.com/www.kokprojekt.com/wp-content/uploads/2021/11/25-scaled.jpg?fit=1024%2C576&ssl=1).

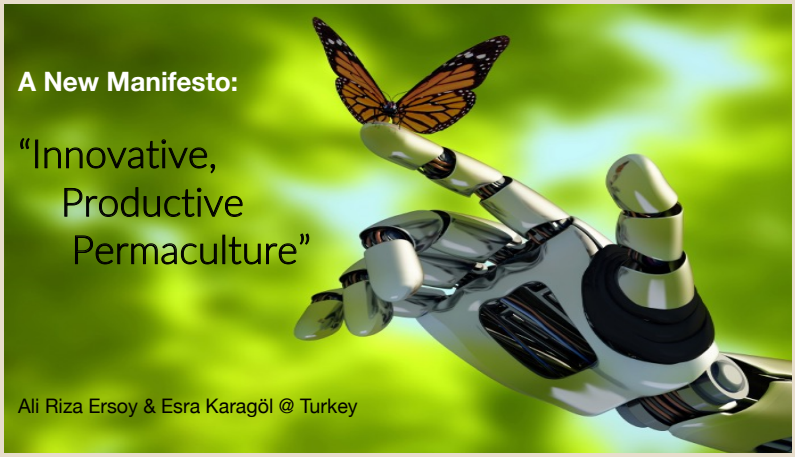
Turkiye has promoted digital applications in agriculture since the early 2000s. Tulin Akin, founder of TABIT, the first digital farm in Turkey in 2004, was an early adopter. She has received several national and international awards and provides service to 1.6 million farmers today [3]. Figure 1 shows categories of stakeholders, such as startups, suppliers, investors, et al., included in the current Agriculture 4.0 ecosystem in Turkiye today. Hundreds of farms are now using Agriculture 4.0 technologies, and the number continues to increase rapidly.

PERMAGRO 4.0

PermAgro 4.0 could be defined as "the establishment of sustainable and traceable technoecological human premises based on ethics, in which multidisciplinary permaculture practices relying on advanced agricultural technology are adopted to benefit both humanity and nature." In other words, PermAgro 4.0 blends ancient permaculture principles with today's Agriculture 4.0 technologies, as symbolically illustrated in Figure 2. However, it should be noted that the achievements of PermAgro 4.0 may differ from those of more general Agriculture 4.0 in terms of natural environment recovery, global equity, and increases in human welfare and happiness.

FIGURE 2

COVER PAGE OF THE PRESENTATION IN MARCH 2021 DURING AN APO PRODUCTIVITY TALK.

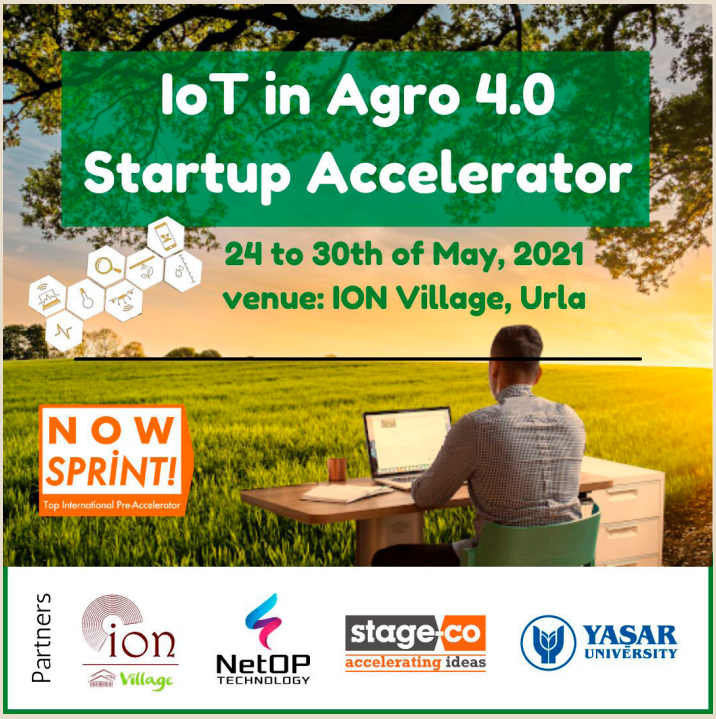


THE ION EXAMPLE

The Ionian civilization spread from Greece to the west coast of Anatolia 3,200 years ago and subsequently gave birth to the Greek and Roman empires. The author's experimental permaculture farm established in 2015 was named ION Village to honor that past. The original aim was for it to be a reference center for permaculture, but it has evolved into a PermAgro 4.0 demonstration facility including guest/worker accommodations, classroom facilities, and an amphitheater where conferences, panel discussions, training courses, etc. are held. The current aim is for ION Village to become an academy for innovative permaculture startups (Figure 3).

FIGURE 3

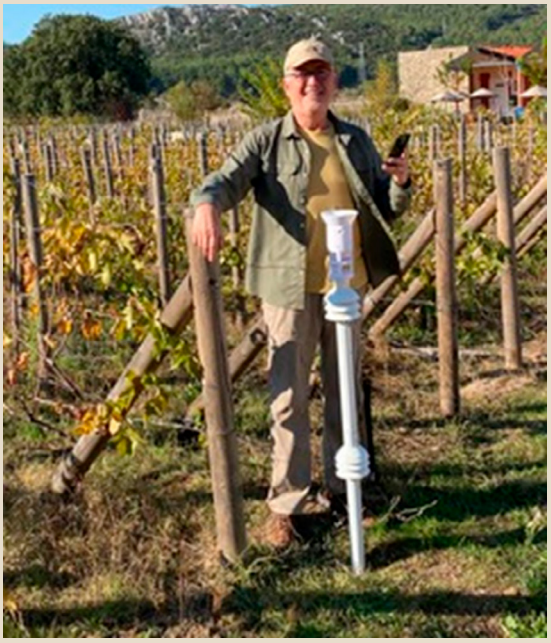
POSTER OF A RECENT ION VILLAGE EVENT.



To achieve that aim, it was evident that ION Village would need to adopt and/or adapt innovative technology-based solutions. The first device adopted, shown in Figure 4, measures several parameters in real time, such as under- and above-ground humidity and temperature, wind speed and direction, amount of precipitation, etc., and sends that information to the cloud via a GSM network. Cloud-based software transforms that raw data into information and sends farmer decision-support messages to users' cell phones, such as "irrigate tonight," "1 ton per *dunam* (1,000 m^2) is sufficient," etc. When this device is connected to the irrigation system, decisions are automatically taken and carried out by the hardware and software. Those decisions are based on both location-sensitive and planet-friendly considerations. It is a source of pride that the hardware and software were created by young Turkish developers.

FIGURE 4

THE AUTHOR PICTURED IN THE ION VILLAGE VINEYARD WITH THE FIRST CLOUD-BASED SENSING DEVICE ENABLING REAL-TIME MONITORING AND INTERVENTION.



It should be noted that most villagers in this area gave up commercial agriculture 30–35 years ago for several reasons, but the most important was difficulties in dealing with frost. According to the ION Village vision, if frost formation can be predicted using Agriculture 4.0 technologies, crops can be saved, encouraging villagers to return to agriculture and adopt permaculture approaches. That is an example of the ION Village goal of "being creative and efficient."

The ION Village achievements in its vineyard would not have been possible without the cooperation and onsite/remote guidance of Esra Karagol and local farmer Umit Demirtas and his friends. The following brief history of that collaboration is summarized in the words of Umut Demirtas.

History of Collaboration between Local Residents and the ION Village Vineyard as Summarized by Demirtas

In November 2015, I met Ali Riza Ersoy and Esra Karagol in our village. They had purchased land in the village and hoped to grow wine grapes. Recognizing that they needed local support, they asked whether I would be interested in working with them. As we discussed the necessary preparations for planting grapes, they mentioned the permaculture concept, which was new to me. I told them that it would be risky to grow grapes under those conditions and explained that the Turkish history of vineyards dated back to 5000 BC.

They responded that the vineyard would be planted with 1-m clearances between rows. I was surprised to learn that the soil would never be cleared or worked over and that weeds would simply be cut and left on the ground surface. The old saying "trying to teach old dogs new tricks" came to mind. At the same time, I could not hide my surprise in learning that Esra Karagol was an agricultural engineer, and that permaculture was applied globally. I said "what if" to myself and decided to try working with them after a short discussion.

Meanwhile, they had already initiated planting procedures. Vines were planted to ensure a clearance of 1 m between root stocks as well as rows. My work began after the completion of planting. We drove piles measuring 3 × 3 × 150 cm at the bottom of grafted vine stock posts to fasten their sprouts to a planar body structure. In the first two years, vines were pruned before they reached the sour grape stage to support root and body development. We began harvesting from the third year.

The soil was never hoed, spaded, etc. Weeds were mowed and left on the soil surface. In the second year, we began to elevate the vineyard by driving wooden piles between vines and by stringing wires between them. The first wire was strung to fasten drip pipes from a height of 20 cm, the second was from a height of 80 cm, and the third was from a height of 150 cm to hold the grape body mass.

Drip irrigation is performed approximately once weekly. Bordeaux mix is applied one or twice in the winter annually. No other pesticides are used. However, no infestations have been detected on grapes or in the vineyard soil. Because the area where the vineyard is located is exposed to constant wind, it may create a healthy climate for the grapes.

Traditional vineyard pruning procedures are performed. In March, body and fruit branches are cut by two to four slots depending on the type of grape; one slot may be left in some grape types. In seeded grapes, pruning must be performed before slots become live since grapes may grow from any slot. In seedless grape cultivation, we prune when sprouts extend to 10–15 cm and when grapes can be seen on branches. "Thinning" is carried out in September to October in traditional viniculture, but we perform this during the cutting procedures in March.

In May, "green pruning" is performed. Sprouts are broken from one slot of vines. If there are too many grapes on the vine, a sufficient number is left to ensure fruit quality and vine health, and the remainder are broken from the base. Weak branches are removed from the bottom of vines as well, although we do not break the ends of branches bearing fruit. If there are too many sprouts, we reduce the number of branches to allow the vines to receive adequate sunlight and wind exposure.

Thus, five years after initial planting, i.e., in the third year of harvesting grapes, the ION Village vineyard became very successful compared with others following traditional and/or modern cultivation methods.

WHAT COMES NEXT: CARBON MINUS

It has become apparent that PermAgro 4.0 alone will not be sufficient to ensure agricultural expansion to feed growing populations sustainably. The next vision is “carbon minus,” a logical extension of the “zero-emission” concept that seeks to reduce the release of greenhouse gases into the atmosphere. The carbon-minus concept goes a step further by requiring us to clean up the pollution damage we have already caused knowingly or unknowingly. On a personal level and based on world average estimates, it will take a 65-year-old individual 15 years of following the carbon-minus lifestyle to repair his/her damage to the planet so far.

CONCLUSION

Humanity has been engaged in agriculture for thousands of years and continued to seek methods to feed their own and animal populations, ensure access to necessary and tasty nutrients, and simplify crop production processes. Significant improvements resulted from the selection and preparation of soil and seeds, improved tools, and more efficient fertilization and irrigation methods.

Humans' first agricultural practices were limited and simple, comprising planting seeds in the soil using readily available tools like sticks and stones and then allowing nature to take its course. The domestication and selective breeding of animals and plants represented a great leap forward. Tools and materials became more sophisticated and specialized over the millennia. Mechanization eventually paved the way for significant increases in production.

However, although the quantity and quality of crops have increased and a degree of agricultural sustainability has been achieved, advances in technology appear to be our best hope to forecast, adapt to, and, if possible, prevent climate-based threats. Permaculture and Agriculture 4.0 practices represent the way forward for sustainable agricultural production.

REFERENCES

[1] Wikipedia: https://en.wikipedia.org/wiki/Permaculture.

[2] McKinsey & Company. Agriculture's connected future: How technology can yield new growth. https://www.mckinsey.com/~/media/mckinsey/industries/agriculture/our%20insights/agricultures%20connected%20future%20how%20technology%20can%20yield%20new%20growth/agricultures-connected-future-how-technology-can-yield-new-growth-f.pdf?shouldIndex=false (accessed 5 March 2022).

[3] TABIT, http://www.en.tabit.com.tr/ (accessed 1 February 2022).

LIST OF FIGURES