

Developments in Asparagus Cultivation under Desert Conditions in Perú

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ABSTRACT

Asparagus was introduced in the Peruvian Coastal area by the 1950 in the northern part (Trujillo valleys). The main purpose was to supply an industry: white asparagus for canning. American cultivars were introduced from California (Mary Washington) and it performed well. Since then the asparagus area increased on the sandy soils of the area of Trujillo yielding good quality white asparagus spears for the industry. It is reported that the white asparagus production area reached 15000 ha near 1980. Basically all the production was confined to four valleys (Moche, Chicama, Viru and Chao) in the Trujillo area all with furrow irrigation, sandy soils and using cultivars from California (besides Mary Washington, UC 72). In 1986 the first commercial green asparagus fields were started in the southern area, Ica. UC 157 F1 was introduced, and the first harvest took place at the end of that year, mainly to supply USA with fresh green spears. Since then green asparagus area started to increase fast in the south and also the hybrid UC 157 F1 started to replace open pollinated types in the north for white asparagus production. Area reached nearly 22000 has by 1999, but that time 70% for white asparagus production and 30% for green asparagus production. Right now 18000 ha are being grown; approximately, green asparagus production is almost 70% and white 30%. Almost all the asparagus productions is exported: fresh 60%, canned 34% and frozen 6%.

As a result of the increased in the asparagus production areas and the unique weather conditions in the Peruvian coast (sandy soil, no rain, not so hot neither too cold climate) production technologies were developed such as improved irrigation using dripping irrigation, better nutrition, adequate plant densities, integrated pest management, harvest the whole year combining crop management and place of production and good agricultural practices. The results of all these technological application is a well recognize quality of the Peruvian asparagus in Europe and USA.

Introduction

Asparagus plantations in Perú are located mostly in sandy soils with very stable weather condition along the coast. Another characteristic is the scarcity of water therefore drip irrigation system is a must in the crop management of this crop. The very little rain registered in the asparagus cropping areas basically is considered of no importance, so it is not taken in account for the water balance of the crop.

All these characteristics in weather, soil and water resources make the asparagus cropping in Perú very unique, allowing very high yield and production the whole year of green and white asparagus spears.

Crop Management

Asparagus plantation usually last 10 to more years. Soil preparation is important for this perennial crop. Since drip irrigation is predominant some leveling is done. Once soil is ready with the supply of irrigation water assured (subsoil layers broken and irrigation system ready) asparagus seedlings or crowns are placed in such a way to have an stand of 25000 to 30000 plants per ha. Irrigation lines are separated between 1.3 and 2.2 m and distance between plants could be 20 to 25 cm.

Manure is usually used to improve soil water holding capacity. Large amount are placed before asparagus crowns or seedling are put in the field (20 to 100 ton/ha). Raw manure can be placed and then irrigated to compost it, and then put the crown or seedling after one or two months, depending of climate. When composted manure is used asparagus crowns or seedling can be planted immediately. Base fertilization can be also done at this moment with the manure. Rates are around 100 to 200 kg/ha of N, P₂O₅ and K₂O.

Once the asparagus starts its growth, several cycles of fern formations occurs (appearance of new foliage). After 12 months of growth harvest is done, foliage productions is around 20 to 30 ton/ha of fresh weight and spear production is around 2 to 4 ton/ha as a first harvest.

Along the first year water is supply according to weather conditions (daily evapotranspiration records) and plant age (foliage, root system). Fertilizers are also supply with the irrigation. N can reach up to 300 to 400 , P₂O₅ 150 to 200 and K₂O up to 300 to 400 kg/ha as a total amount during the first year, including base fertilization. Other nutrient like Ca, Mg, S and micronutrients also are applied when necessary, previous chemical analysis.

Integrated pest management is practiced in most of the asparagus plantation trying to keep pest damage in small percentage and to avoid the use of too many pesticides. Insect problems are thrips, worms of *Heliothis virescens*, *Copitarsia decolora*, *Spodoptera spp*, *Prodiplosis longifila*. Also red mites are problematic. Diseases are also present like *Cercospora*, *Stemphilium* and rust .



Figure 1: Main asparagus growing areas in Peru.

After the first harvest, which can last 15 to 30 days, a new cycle of fern formation begins, depending of climate two to three growth cycles occur before the second harvest is done. This usually happens after 4 to 5 months. Also, growth or new fern formation can go ahead but withholding irrigation growers in certain way can control it avoiding more growth and promoting carbohydrate translocation to the crown and roots and in this way prepare the plant for the second harvest. Once the second or third fern cycle is over, after the first harvest, irrigation is decreased in such a way that avoid a new fern cycle. This is the most common way growers use to control plant growth in asparagus and it is a tool to program harvest in large plantations, especially when weather conditions are favorable for plant growth. Second harvest can last from 30 to 45 days with an expected yield of 4 to 6 ton/ha . After the second harvest plants are allowed to form their foliage, two or three fern cycles after 4 to 5 months and third harvest is done, usually from now on yields are between 5 to 7 ton/ha in each harvest depending when it is done and in what location. Two harvests

per year is the most common way asparagus crop is handled but there are some growers that harvest once a year with a harvest period of 90 to 120 days, which four fern cycles after 8 to 9 months (fig. 2). When harvest is done twice a year mostly one harvest period last 30 days and the other one 60 days.

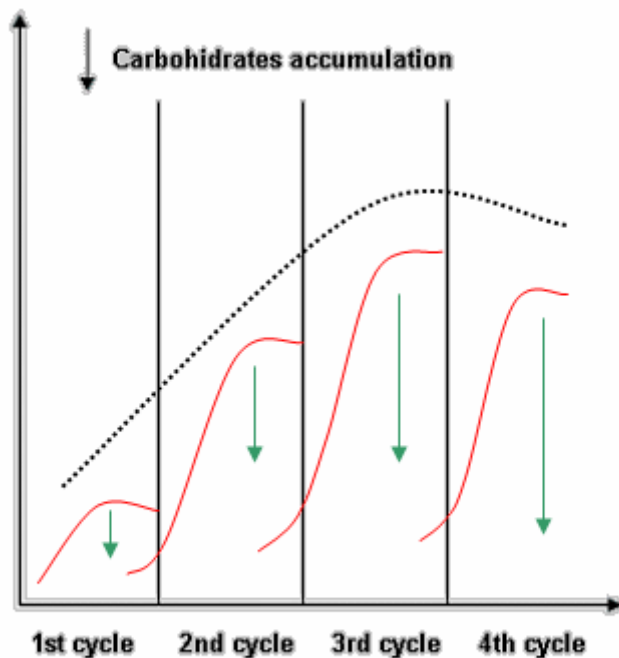


Figure 2: Fern cycles of asparagus and carbohydrates accumulation in some areas in Peru (Sanchez, 1997)

Differences in climate in the different valleys along the coast permit harvest the whole year. For example in winter season (June, July and August) the high production per day per hectare is observed in Nepeña, Casma, Culebras and Huarmey (N2 in the map) because of their warmer weather in comparison to others valleys like Ica.

The other months all the other valleys can produce easily high daily productions. The region that reports the highest yield is Ica valley (S3 in the map) with an average of 14 ton/ha compare to the country average of 10 ton/ha.

Green asparagus production is the predominant right now (70% of the total production) as a result of a high demand not only for fresh but also for cannery and frozen. New areas are planted every year with the main purpose to replace old plantations and to keep the country level of production to keep supplying the foreign market. It is estimated that at least 1000 new hectares every year are needed to keep the present level of production of the country. All what is produced is oriented to the foreign market as a fresh produce, in cans and bottles or jars and frozen. Less than 1% of the total production is consumed in the country.

The strict requirements of the American and European markets has obliged Peruvian producers, processors and exporters of asparagus to fulfill and acquire many certifications like HACCP, EUREPGAP and BASC. In this way

Peruvian asparagus products are well recognized for their quality and assurance of good agricultural and manufacturing practices (GAP and GMP).

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