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in

Llácer G. (ed.), Badenes M.L. (ed.).
First international symposium on loquat

Zaragoza : CIHEAM
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 58

2003
pages 147-150

Economic and technical evaluation of different systems of loquat protected crop

M. Lorente*, J.V. Orts*, E. Soler and M.A. Capilla*****
Servicio de Desarrollo Tenológico, Consellería de Agricultura, Pesca y Alimentación,
Amadeo de Saboya 2, 46010 Valencia, Spain
**Coop. Agrícola de Callosa d'En Sarriá, Partida Micleta, s/n, 03510 Callosa d'En Sarriá, Spain
***Coop. Agrícola de Altea, Ptda. Montahud, 36, P.O. Box 110, 03590 Altea, Spain

SUMMARY – The culture of loquat (*Eryobotria japonica* Lindl.) in the region of "La Marina Baixa" has a substantial social and economic impact. In order to get earlier cropping, different systems of polietylen mesh screens have been introduced. However this cultural practice produced some negative effects, such as the increasing of "purple spot" on the fruits. Appliyng water with microsprinklers reduces the percentage of fruits affected by "purple spot". The high cost of the equipment needed to install the mesh and microsprinklers showed the need of an evaluation and comparison of all systems employed. The results and conclusions are presented in this paper.

Key words: Loquat, protected crop, technical and economic evaluation of different systems.

RESUME – *"Evaluation économique et technique des différents systèmes de culture protégée du néflier". La culture du néflier (*Eriobotrya japonica *Lindl.) dans la région de "La Marina Baixa" présente un impact substantiel d'ordre social et économique. Afin d'obtenir une récolte plus précoce, différents systèmes de mailles de polyéthylène ont été introduits. Cependant, cette pratique culturale a entraîné quelques aspects négatifs, tels que l'augmentation de la tache violette sur les fruits. L'application d'eau avec des microasperseurs réduit le pourcentage de fruits affectés par la tache violette. Le coût élevé des éléments nécessaires à l'installation des mailles et des microasperseurs oblige à évaluer et comparer tous les systèmes employés. Les résultats et les conclusions sont présentés dans cet article.*

Mots-clés : *Néflier, culture protégée, évaluation technique et économique des différents systèmes.*

Introduction

In the region of "La Marina Baixa", in Alicante, loquat (*Eryobotria japonica* Lindl.) species is the main crop and the first income from agriculture. At the present moment, about 1500 ha are grown, which is near to 30,000 tonnes, with a market value of 30,000 euro. The number of growers rises up to about three thousand people.The average farm size is 0.5 ha. The production from the area accounts for 85% of loquat in the Comunidad Valenciana and the 65% of the loquat area cultivated in Spain.

In order to protect fruits from adverse weather conditions, specially from wind, and to advance the harvest season, many farmers proceeded to install greenhouses with polyetilen 800 PE screens. As it was expected, the greenhouses resulted in earlier harvesting, but resulted as well in premature ageing of fruit and an increasing of the physiological disorder named "purple spot".

Consequentely, farmers tried to solve these effects by different ways of controlling moisture and temperature inside of the greenhouses. The only suitable technic was foliar water application using microsprinklers, although it should be more deeply studied.

By the other hand, the initial failure of the crop under polyetilen rose the question of changing the polyetilen plastic screens by a transpirable mesh, while making good use of the old greenhouse estructure. Therefore, it is necessary to calculate the cost of the different alternatives and evaluate their impact in the total crop cost.

Material and methods

Plant material

Two cultivars were chosen: 'Algerie' because is the main cultivar in Valencia (it accounts on 95% of total loquat production in Valencia) and 'Redonet', an earlier cultivar. The trees chosen were 12 years-old, grafted on loquat seedlings. The plot had an average density of 624 trees per ha. Culture was carried out as the Cooperativa recommended.

Experimental design

The study consisted in the following experimental plots:

(i) 'Algerie' outdoor (reference plot)

(ii) 'Algerie' with plastic-greenhouse-800 screen.

(iii) 'Algerie' with plastic-greenhouse-800 screen and water spraying.

(iv) 'Algerie' with nylon mesh screen from 6 × 6 mm^2.

(v) 'Algerie' with nylon mesh screen from 6 × 6 mm^2 and water spraying (data from 1997 and 1998).

(vi) 'Redonet' with plastic-greenhouse-800 screen.

(vii) 'Redonet' with plastic-greenhouse-800 screen and water spraying.

In the water sprayed plots the microsprinklers were set up over the trees, hanging from the upper greenhouse structure. One emiter per tree was placed with a unit watter volume (Qu) of 28-32 liter/hour. The microsprinklers were controlled by measuring devices, which switched the foliar water application when the set limit values were reached.

The values set in 1996 were: when temperature of the greenhouse exceeded 30ºC or when humidity came down to 70%. Due to the stringency of these conditions, in the next two croping years these limits were: when temperature exceeded 25ºC or moisture came down to 60%.

The operating period was: from February 16 to April 14 in 1996, from February 12 to April 13 in 1997, and finally from February 20 to April 13 in 1998.

Water used for spraying was the same that used for irrigation. Its main features are high pH (8-8.3) and high calcium carbonate contents. The water comsumption of microsprinklers per season varied from 190 to 350 m^3/hanegada (835 m^2).

Control of fruit harvested

Fruit was totally harvested from the selected trees. Every fruit was weighted and classified according to the standards of quality and size set by the Protected Origin Denomination "Nísperos de Callosa d'En Sarrià".

Evaluation of the cost from different production systems

All the costs were computed per hanegada (835 m^2). The index resulted from discounting the specific costs of the different systems from the income per hanegada. As a reference plot was used 'Algerie' cultivar grown outdoor.

Conclusions

If the farm is located in a windy area, there is no option but the mesh protection. It is also recommendable to set water spraying systems, specially in those zones of late harvest.

The most profitable option is growing outdoors the 'Redonet' cultivar in the suitable farms.

To achieve early maturity, the screen covering is not recomended due to its high instalation costs. Earliness must be obtained by means of early cultivars grown in suitable farms.

For the 'Redonet' cultivar in windy areas, only the mesh screen should be used.

The plastic screen resulted in an earlier harvest season of about 10 or 12 days before for the 'Algerie' cultivar and of about 6 days for the 'Redonet', both cases compared with the outdoor crop (Fig. 1).

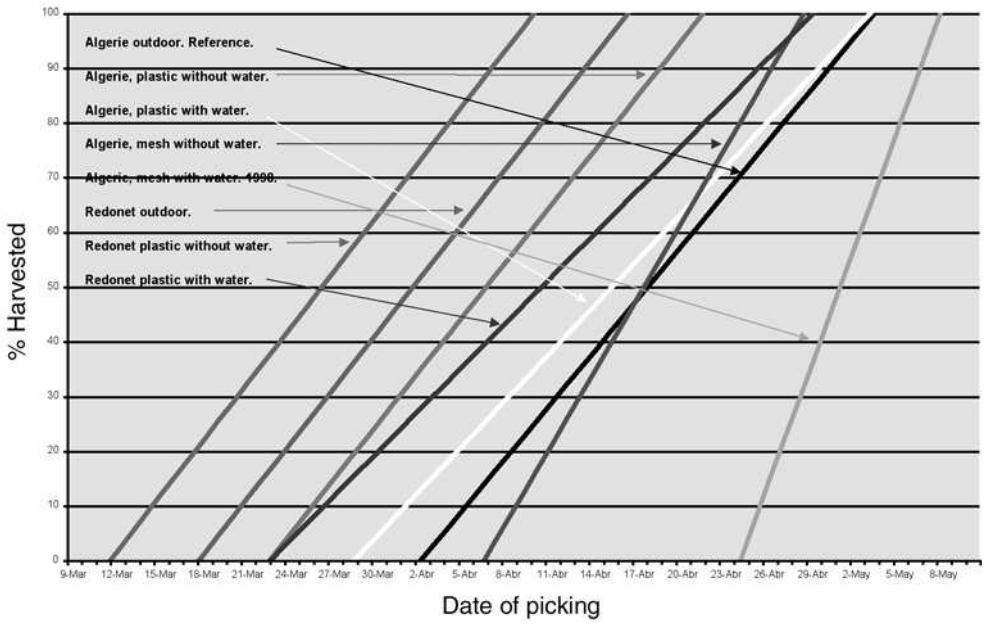

Fig. 1. Percentage of fruits harvested according to date and trial.

With the mesh screen, harvest resulted in a 4 days delay. However, the ripening was more agrupated resulting in a shorter harvest period.

Generally speaking, harvest happened later with water spraying. As it is asociated with plastic or mesh screens, more particular considerations must be done together.

Plastic covering seems tend to reduce fruit size while mesh covering increases fruit size (Fig. 2).

What has been more clearly stablished is that water spraying helps the fruits to get bigger (GG, GGG size). So when this watering system worked together with mesh screens great succesfully results were obtained.

The 'Algerie' cultivar is normally more "purple spot"-susceptible than 'Redonet'.

The plastic screen increases "purple spot".

The mesh screen has no apparent significant effect on "purple spot" damage.

The percentage of damaged fruits by "purple spot" is significantly reduced by water spraying,

although two situations must be clearly considered separately: first one is water spraying under plastic screen, in which the negative effects of covering are bigger than the ones of water spraying. Second one is the water spraying under mesh screen, where there was more than a 15% decreasing of damaged fruits.

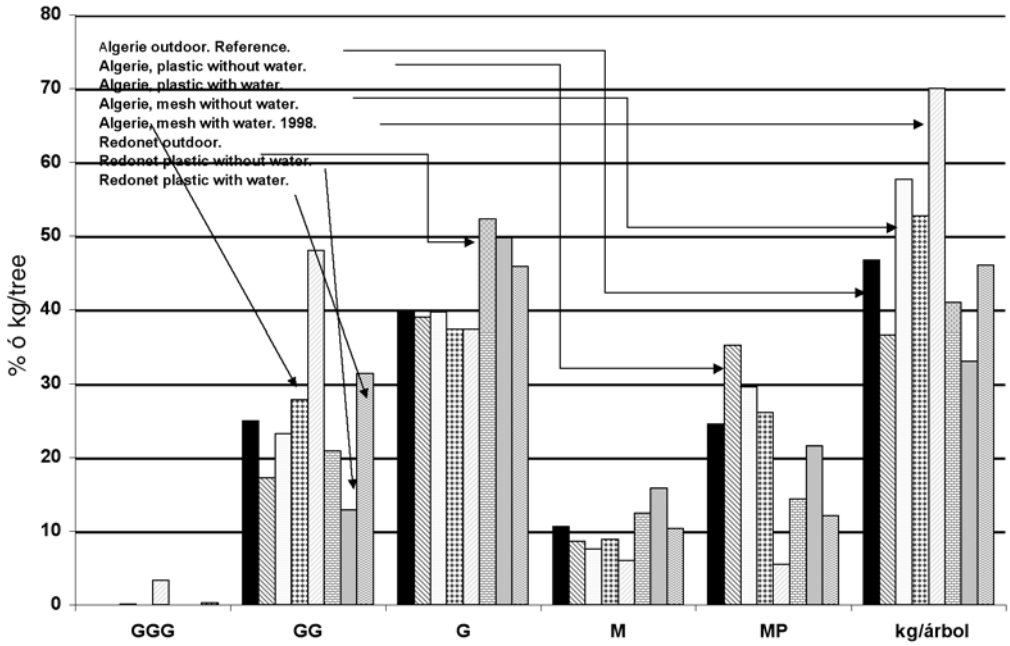

Fig. 2. Average data from crop years 1996-1998 of percentage of fruit size, purple spot and average yield in kg per tree.

As far as concerns to calcareous precipitates on the fruit and leaves due to the water hardness, it must be emphasized that microsprinklers with a water volume of 28 liter/hour did not cause any serious problems of precipitates formation, since this bigger volume bleached the excess of calcium. Problems only appeared when used microsprinklers or mist sprayers with less water volume.