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Technical Notes from Strawberry Production Trails in 2009/2010

Introduction

Strawberry production is a profitable enterprise, provided that regular watering is available and markets are accessible. Even small areas can be profitable, particularly since the berry is ripe when little other fresh fruit is available.

The local market responds very positively to strawberries, illustrated in one community when a JDA project offered strawberries as a snack during a meeting. This was the first time village members in Shura had seen strawberries. First, the elders looked uncertainly at the berries and did not taste them. But moments after the first fruit was sampled they had all disappeared, and everybody was talking about the strawberries

Seascape has been identified as a good producer for Northern Afghanistan. And while simple production is profitable, black plastic mulch and green house production can increase yield and profits significantly. Wide spacing is a typical mistake by inexperienced farmers, but spacing of 30 x 40 cm was found to yield more than twice as much as 60 x 40 cm.

Project Summary

JDA has been working with strawberries since 2005, initially varieties from projects started in Kabul. Finding these varieties to be of limited productivity and on advice from a consultant, we then tried some US varieties with greater success. Three of these US varieties are discussed here.

In the planting season of 2009/10 and 2010/11 more than 90,000 starts were distributed or sold to over 120 producers either through JDA projects directly or via producers who had received plants in 2008 and had made their own sales since. The largest producer has around 0.2 ha of strawberries and sold more than 6,000 USD of plants and fruit last year. They consider 4,000 USD to be profit.

The spring/summer harvest season lasts about 70 days. At their peak, strawberries wholesale at between 3.10 and 3.40 USD/kg and at around 2.45 USD for the last few weeks. With first sales at the end of March when other fruit is not yet available, it is prominent in the market and provides important revenue.

To build this still new economy, it is crucial to develop recommendations for best-practices, establish the parameters for economic production, look for new adapted varieties, produce clean parent material, and provide agronomic and marketing training to producers, NGOs and government stakeholders. It is also necessary to support skilled producers to increase local capacity to produce and sell clean starts to ensure sustainability.

This technical report is not a training document, but does contain important recommendations that come from the data, interpreted in the context of our experience with the growing number of producers in Northern Afghanistan.

This report is based on: 200 m^2 and trials carried out in 2009/10 at Dedadhi in Balkh where 96 plots (also 200 m^2 in total) of strawberries were grown according to treatments based directly on the issues and production systems particular to producers in Northern Afghanistan, see table 1.

Table 1: Treatments in 2009/10 AWATT

Strawberry Trials

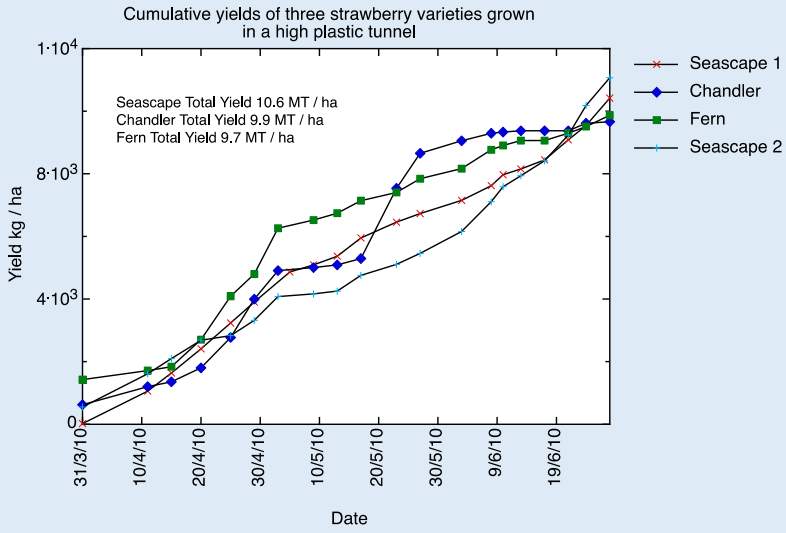
Treatment	Level
Mulch	Black Plastic
	White Plastic
	None
Environment	High Plastic Tunnel
	Outside
Irrigation	Drip
	Furrow
Spacing	30 cm
	60 cm

Variety Observation

Two new varieties, Fern and Chandler, were brought in for trial this year from the US. They were grown alongside the previously selected variety, Seascape, in two high plastic tunnels.

The yield data, shown below as a cumulative yield chart for the three month cropping period March 31st –June 28th , shows that Seascape yielded a little more in total and with greater consistency. However, there is some indication that Fern in particular, and Chandler to a lesser extent, are able to yield a little higher, earlier.

Since earlier harvests are more valuable this justifies more work with the two new varieties.



Main Trials

a. Dates

Results

Strawberries grown under plastic on March 23rd and outdoors 13 days later though still at a very low level. Yields continued for 67 days, after which there was little marketable fruit. Most of the yield was picked in the 20 and 40 days after the 23rd of March.

An average of 6.1mt/ha was harvested across treatments.

Discussion and Recommendations

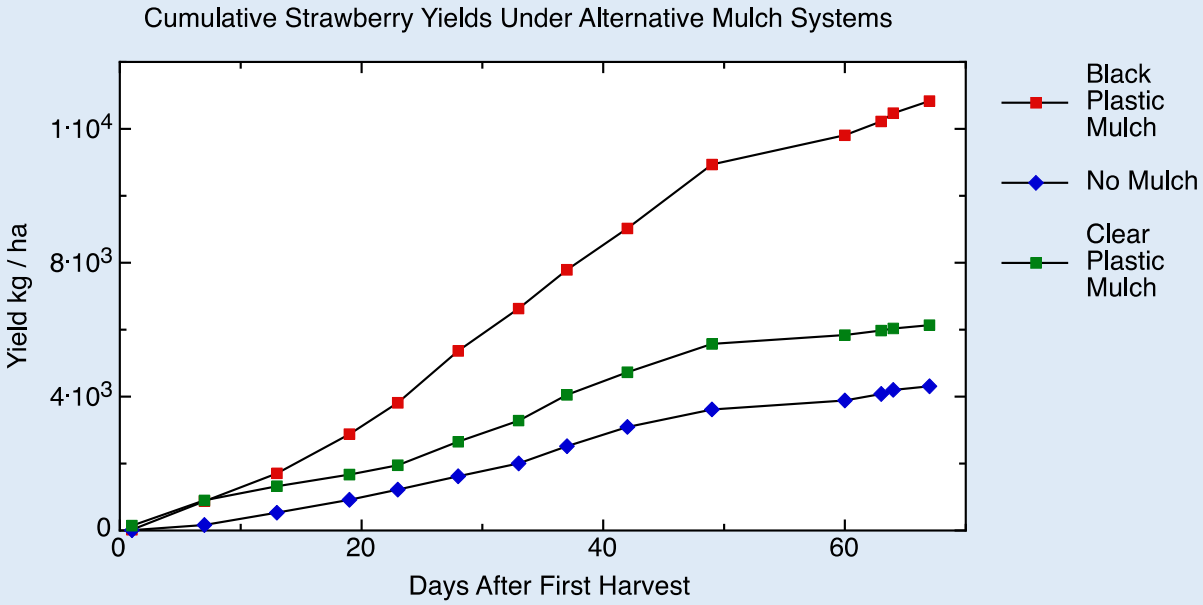
Early harvested fruit achieves higher market prices and may be helpful for producers trying to establish relationships in the market place. Early production can be achieved by using black mulch and planting under plastic where pollinators may need to be introduced – more notes under the relevant sections below. The first harvest period comes to a stop in the heat of the summer, in 2009/10 by the end of May. A second harvest period can be achieved after the summer, starting at the end of September in 2010 though the market is much less receptive at this time. No data was gathered in the second period in this year.

b. Mulch

Results

Mulch accounted for greater variance than any other parameter. Black plastic, clear plastic, and no mulch treatments were applied to plots. Black plastic mulch performed far better than any other yielding nearly 4 times no mulch plots outside, and 2.5 times no mulch plots under plastic. Clear plastic mulch also performed better than no mulch.

Black plastic mulched plots had a total average yield of over 12 mt/ha which was more than twice the yield of clear plastic mulch plots.



Discussion and Recommendation

Organic mulch was not tested in this work, though it seems likely that this would improve on the no mulch option and should be tested.

Black Plastic Mulch should clearly be a standard recommendation for strawberries produced outside in Balkh though it has been shown to contribute to overheating in some conditions so some caution is needed particularly for production under permanent plastic and production plots should be observed closely later in the summer.

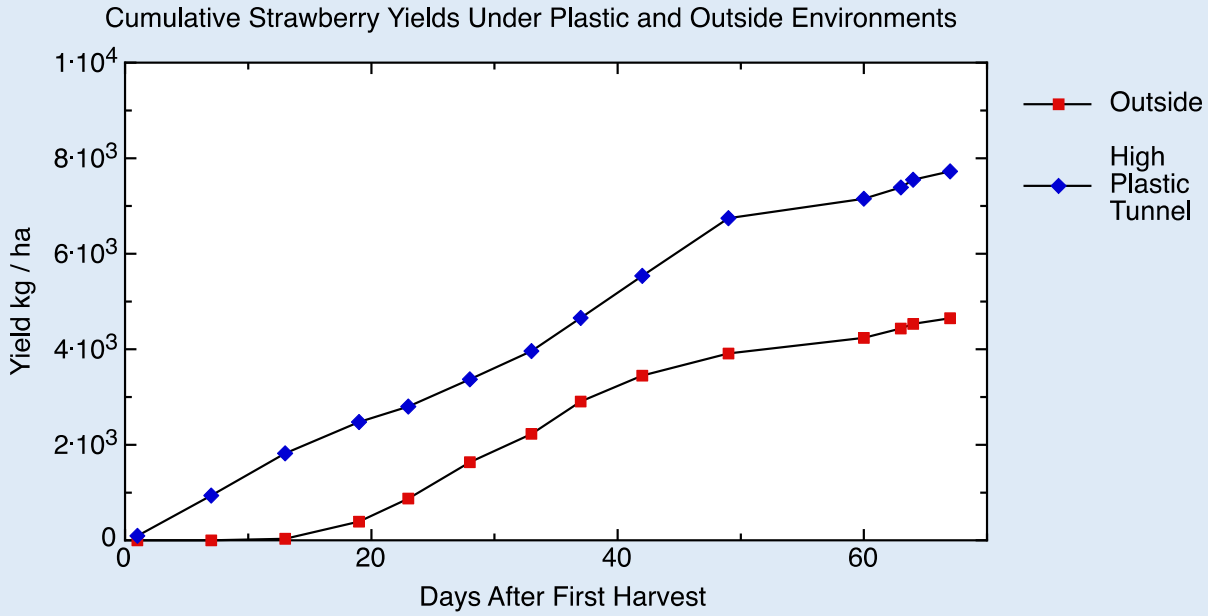
Black plastic mulch increases early season soil temperatures, brings earlier fruit, improves moisture conservation (note its positive impact on the drip irrigated plots), and controls weeds very effectively.

c. Environment

Results

Strawberries were grown under a high plastic tunnel and outside. There was no replication for this treatment, but strawberries in the tunnel started producing two weeks before outdoor grown strawberries; favourably at a time when the market price is at its highest. For a 100m^2 tunnel size, an average of nearly 20 kg more strawberries were produced in the first 3 week period than outdoor grown strawberries: worth more than 120 USD extra to the producer.

This higher level of production continued throughout the first 60 days of production when measurements were taken, during this period production under plastic was 66% greater than outdoor strawberries, equivalent to more than 3MT per ha.



Discussion and Recommendations

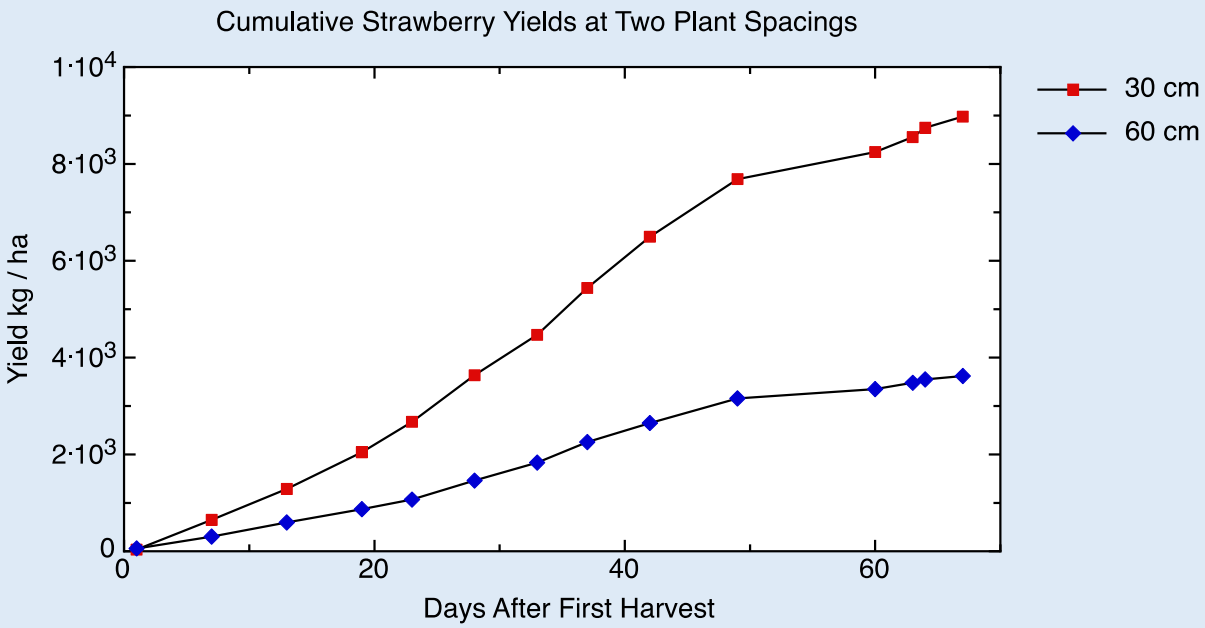
A 100m^2 tunnel can produce 200 USD extra fruit per year at 2010 prices and more from increased plant production. Strawberries benefit from shading in Mazar's summer conditions, and the high tunnel frame can be used for this purpose later in the season – a benefit not included in this calculation. It should be possible for Afghans to profit from constructing high plastic tunnels for strawberries, but pollination, particularly for early production, should be considered carefully: ideally introduced by mid-March.

To allow for adequate virilisation, and to ensure that plants establish well and fruit does not drain the plant and frost before ripening, it is recommended that tunnels are not fully covered until mid February.

d. Spacing

Results

Increasing planting density from 60cm to 30cm spacing, multiplied yields by a factor >2, ($p<0.001$). In fact, the yield advantage was even greater for the higher yielding strawberries grown under plastic (factor 2.6).



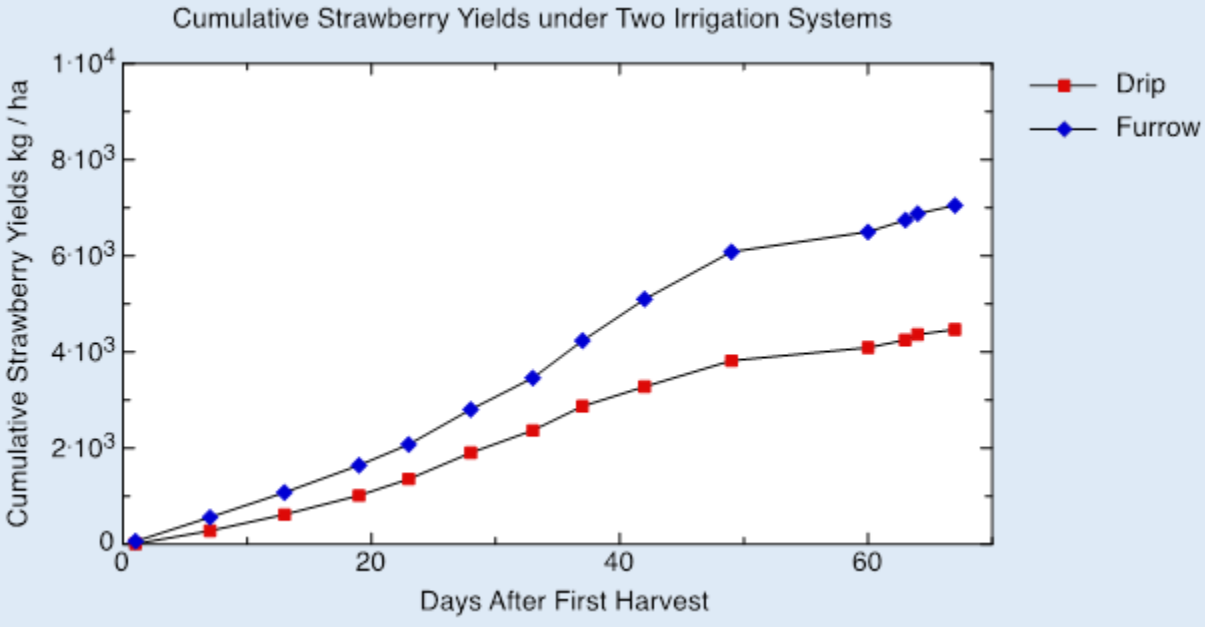
Discussion and Recommendations

It is expected that the lower planting rate will favour plant production, for fruit however, the 30 cm spacing can be recommended. Annual transplanting of starts is good practice for low input disease control and again, this, and the relatively small plant sizes favour higher plant densities.

e. Irrigation

Results

Drip irrigated strawberries yielded around 4.5 mt/ha across treatments. For production under plastic there were large yield penalties for drip irrigated plots verses furrow irrigated ones. Outdoors, the results were very different. Mulched plot yields were the same, but without mulch, furrow irrigated plots yielded 70% higher.



Discussion and Recommendations

It is possible to produce excellent crops using drip irrigation.

Outdoor crops can be produced using drip irrigation with no yield penalty as long as quality mulch is used. However, crops should not be grown outdoors without a mulch under any circumstance.

Our drip irrigated plots grown under plastic performed very poorly, and care should be taken to mulch properly and check that an adequately working system is in place if this is to be used.

Conclusions

Important improved management techniques demonstrated in these trials included the use of black plastic mulch and high plant densities. Both under plastic and outside, these better managed plots yielded in excess of 10 mt/ha during the 70 day spring/summer harvest season relating to revenues in excess of 40,000 USD/ha from fruit alone. Plant production could be worth an extra 4,000 USD/ha.

The success of drip irrigation when mulch was used in outdoor conditions shows that strawberries can be grown by carefully managed drip systems. However, some drip irrigated plots failed, so extra attention is needed.

Earlier production and overall higher yields under plastic make high tunnel production a viable and attractive approach. But this requires more management to ensure that 1) covering is carried out at the appropriate time; 2) pollinators are present; 3) irrigation systems are working, as to cover the increased investment.

Worthwhile factors not studied here is the use of biological mulches, and examination of the second two-months fruiting season beginning middle of September. However, strawberry agronomy has improved significantly and benefited the growing number of producers and NGOs getting involved in strawberry production in Northern Afghanistan.