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Agriculture Intensive dans les Iles de la Caraibe : enjeux, contraintes et perspectives
Intensive Agriculture in the Caribbean Islands : stakes, constraints and prospects
Agricultura Intensiva en la Islas del Caribe : posturas, coacciones y perspectivas

TESTING OF THREE TREATMENTS TO CONTROL BRANCH DEVELOPMENT ON LIVE POSTS OF GLIRICIDIA (GLIRICIDIA SEPIUM) USED AS TRELLISES IN PASSION FRUIT PRODUCTION

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ABSTRACT

The main obstacle for the generalized use of live posts of gliricidia in the production of passion fruit is the profuse crown growth in gliricidia, which requires frequent lopping. On a 1.5 year-old plantation of passion fruit in Dumbarton, St. Vincent, three treatments were used to control branch development in the gliricidia posts. The two nontraditional treatments, application of 25 cm^3 of CULTAR (25% paclobutrazol) and girdling of the posts, resulted in significant reduction of branch production in comparison with the control treatment which consisted of lopping only. Posts treated with CULTAR showed the most drastic reductions in branch growth. No effect of the treatments on post mortality was observed. The new tested treatments have a potential to significantly increase the cost-effectiveness of passion fruit cultivation in the Caribbean.

BACKGROUND

Live posts of Gliricidia sepium (Jacq.) Walp. have been used in the past for supporting passion fruit vines as well as other vine crops (Budelman and Pinners 1987, Liyanage 1987, Seibert 1987). A major ... their generalized use in passion fruit cultivation in St. Vincent is the profuse crown growth in gliricidia, which requires frequent lopping. Three treatments, including lopping, are used in an

on-farm trial in Dumbarton, St. Vincent, aiming at ensuring adequate support of passion fruit vines during at least one productive cycle (3-4 years) while avoiding shading levels that could affect fruit production.

OBJECTIVE

The objective of the trial is to determine the comparative efficiency of three treatments for controlling branch production in the live gliricidia posts. The treatments are lopping only, girdling, and application of paclobutrazol ("CULTAR").

The green weight of branches produced under different treatments is a straightforward indicator of their capacity to produce desired results. This is because of the direct relationship between this easily measurable parameter and important variables such as shading capacity, lopping frequency and treatment cost. Thus, green weight of branches per period is used as an indicator of treatment efficiency in this trial. This, however, is analyzed in conjunction with other factors such as cost, number of required interventions, and post mortality.

SITE DESCRIPTION

The trial was established in November 1992 on a 1.5 year old plantation in Dumbarton. It is a 0.15 ha plantation in full production, where live gliricidia posts were planted in May 1992 following failure of nontreated wooden posts. The site is on a gentle slope with southern exposure, located within the Subtropical Wet Forest Life Zone of Holdridge's (1967) ecological classification. Latitude is 13° 10' N, altitude is 150 m asl, and the meteorological station at the Dumbarton Agricultural Station registered an average annual rainfall of 2638 mm for the 1980-1990 eleven-year period.

METHOD

Treatments involved

Lopping only. This implies cutting off all branches and twigs of the live posts. Tools used are pruning shears and pruning saws. Treatment frequency is adapted to observations on the shading of the crop.

Girdling. It is total removal of bark and phloem, and part of the cambium, on a ring-shaped area encircling the live post. Width of the ring is approximately 1 cm. The girdling is done low within the first meter of the post. A grafting knife is used. Girdling brings about stress on the gliricidia by hindering the flow of photosynthetic products from crown to root. This is expected to reduce vegetative growth.

Girdling depth is difficult to control within the cambium layer. During the incisions that define the borders of the ring, the knife stops at the xylem, that is, beyond the cambium. When the ring is peeled, however, an indeterminate portion of the cambium stays. This, and the regenerating capacity of the tissues, keep the gliricidia alive. The intention in the trial is being conservative in girdling depth and width for avoiding deaths of live posts. This girdling procedure was adopted following a preliminary 3-month test of different girdling intensities on other farm where gliricidia trees are used as a live fence.

Girdling is executed once on every post at the time of establishment. The treatment is complemented with lopping as necessary.

Paclobutrazol application. Paclobutrazol is a gibberellin inhibitor used in the fruit industry to reduce vegetative growth and induce flower and fruit production. CULTAR, a commercial solution of 25% paclobutrazol, is applied in this trial at a rate per plant of 25 cm^3 mixed with 25 cmJ of water. This is done on one single intervention at establishment time. Application is done on a small dip on the ground at the base of the post and on the uphill side. As in the case of girdling, the treatment is complemented with lopping as necessary.

Expérimental design and layout. The experimental design used is the randomized complete block design (RCB). Four blocks were established, each of them comprising three plots or treatment areas of five consecutive live posts per plot. The rest of the plantation was treated with lopping only.

RESULTS

Establishment of the trial was concluded on 6 November 1992. At that date, lopping was also carried out on all the treatments.

Between 12 February and 2 March 1993, lopping was repeated on all the treatments. At the same time, the green weight of the extracted branches was measured on site for each post. Another measured parameter was the length of the longest branch of each post. At that time it was found that the average reduction of branch production in comparison with the control treatment, lopping only, was 39% in girdled posts and 69% in posts treated with CULTAR, with fairly consistent results obtained in every block and no noticeable effect of treatments on mortality. Average reduction of the length of longest branch in comparison with control was 21% and 34% for girdled and CULTAR-treated posts respectively.

A second intervention took place on 3 May 1993, approximately six months after establishment and 2-2.6 months after the last intervention. This time, branch growth in posts treated with CULTAR was so low (length of longest branch lower than 40 cm) that no intervention was justified for this treatment. Thus, only posts under the other two treatments were lopped. Measurements were taken as in the first intervention.

Table 1 shows the green weight of branches per post lopped during the first six months of the trial for each treatment. There is a reduction in average branch production during the period, in comparison to the control, of 34% and 77% for the girdling and paclobutrazol treatments respectively. The treatments showed significant differences at the fourth month ($p > 0.05$), the second lopping at the sixth month ($p > 0.01$) and the aggregate results ($p > 0.01$).

Table 2 shows the average length of longest branch per post for each treatment at the two lopping dates. The treatments resulted in significative differences at both the first ($p > 0.05$) and second lopping ($p > 0.01$).

The mortality to this date could not be linked to the treatments.

Five posts, or 8.3% of the posts in the trial, died during the sixmonth period (2-control plots, 2-girdling, l-paclobutrazol).

DISCUSSION

Both paclobutrazol application and girdling resulted in significant reduction of branch production in comparison with the control treatment (lopping only). The most drastic reductions of branch growth were observed in the posts treated with CULTAR. The treatments did not show statistical differences for mortality of posts.

Both girdling and paclobutrazol application have the capacity to reduce maintenance costs of the plantations by reducing the frequency of lopping, which is a function of branch growth. Treatment costs must be considered, though. Girdling is a simple, low cost operation, particularly when it is done with a grafting knife or a similar tool. CULTAR, however, is still a relatively expensive chemical. The one-litre bottle sells for approximately US $70.00. This makes the cost of material per post US $1.75, or EC $4.70. While this might be considered a convenient alternative in st. Vincent to the imported preservative-treated posts (whose cost is around EC $15 per post), the cost of the described CULTAR treatment may be unacceptable to many farmers. There is need to investigate the possibilities of using lower concentrations of CULTAR for controlling branch growth.

A second trial involving the described treatments plus two treatments consisting of 5 cm^3 and 10 cm^3 of CULTAR respectively was initiated in March 1993 in a farm at Richmond. The effects of these new treatments are to be monitored simultaneously with the Dumbarton trial. This could permit more precise recommendations in the future on the use of live posts and the methods of controlling branch growth.

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Table 1. Green weight of branches (kg) per gliricidia post. Sixmonth period.

Treatment	First lopping (fourth month)	Second lopping (end of sixth month)	Aggregated
Lopping only	2.52	0.94	3.46
Girdling	1.55	0.73	2.28
Paclobutrazol	0.78	-	0.78
SE N (d.f.6)±	0.308	0.151	0.343

Table 2. Length of longest branch (cm) per post.

Treatment	First lopping (fourth month)	Second lopping (end of sixth month)
Lopping only	192.2	131.0
Girdling	151.5	117.0
Paclobutrazol	127.3	_
SE M (d.f.6)±	12.90	8.14