PHYTOSANITARY SERVICE IN THE SUGARCANE INDUSTRY IN CUBA

By

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KEYWORDS: Sugar Cane, Pest Control, Phytosanitary Service.

Abstract

RESULTS obtained from 2000 to the present due to the implementation and generalisation of a Phytosanitary Service (SEFIT) is presented. This service has made an impact on the presence and control of pests and in moderating losses caused by them in cane production. It takes into account the active participation of the human capital inserted into the service, its qualification process, the recognition and registration of pests, pursuit of quality seed production, and developing main links to obtain healthy plants and pest control. Recommended measures take into account the biology and protection of the environment. The Service includes an automated version, unique of its type in Cuba, which allows making decisions regarding the integrated handling of harmful organisms, and consideration of the epidemiological of the strains, crop conditions, and commercial cultivars. It is also involved in the regulation of those factors presenting phytosanitary problems. The advances in the organisation of the phytosanitary service in sugarcane in our country are shown. This scientific and technical service offered by the National Sugarcane Research Institute (INICA) has shown significant benefits by preventing losses of sugar in excess of 700 000 tonnes, (market value of US$216 933), due only to smut. In addition, there were other benefits, such as lowering of indexes and percentages of infestation by pest, preventing the introduction of exotic organisms, and the reduction of rates of biological control products used to reduce incidence of pests and diseases.

Introduction

Currently, 139 pathological disorders have been reported on sugarcane worldwide, caused by pathogenic microorganisms, environmental disorders, parasitic plants and other causes. In Cuba, only 58 of these have been detected and of these, only 8 or 10 are considered of economic importance (Chinea and Rodríguez, 1994).

On the other hand, of the more than one thousand insects known to occur on sugarcane, only borers cause large economic losses to the sugar industry. Other pests of importance in Cuba are rodents, defoliating and sucking insects and nematodes.

Proper use of biological controls has resulted in decreased population levels of these pests and consequently decreased losses.

The Phytosanitary Service (SEFIT) is a new organisation created to make recommendations for recording and controlling new pests and reducing losses, with active participation of producers after receiving proper training.

Materials and methods

Results of phytosanitary research and production practices on sugarcane were compiled, and a diagnosis by visual symptoms made of the knowledge which was made available to experienced producers. Two annual samples were established in selected fields, on different plant age, time of planting and harvest, and varieties. For pest evaluation, in plant and ratoon crops, a stratified

sampling of 6 fields was conducted and the results obtained were grouped in ranges of 1–4 categories, where number 1 represented absence (INICA, 2006). With this information, a database was created and processed using an automated system.

Results and discussion

The information gathered from research and production data and the results from the report applied to experienced producers served as the basis for establishing the work methodology.

The development of this program raised the comprehension and execution level of actions in the implementation of the Service as well as raising the control level of pests with emphasis on environmental conservation.

From the results obtained, together with information disclosure and training, the Service was extended to all cane production areas.

This novel automated system is designed to analyse and classify pests and diseases by order of location importance, level of damage, and recommendations for control.

Behaviour of sugarcane diseases: smut, rust and leaf scald

Smut and rust are diseases that have been established in the country for more than two decades and remain in the first order of importance.

The management obtained by the composition of varieties, both at the national and provincial level, has allowed the reduction of these disorders.

Table 1 shows that areas affected by diseases at an intensity of severity from medium to severe has remained for the last three years in a range (percentage) of 5% in the case of smut and at not a very significant value in the case of rust and leaf scald.

Table 1—Distribution of smut, rust and leaf scald (acres).

Grade	Category	Smut					
		Area 2006	%	Area 2007	%	Area 2008	%
2	Light	187 883.14	33.34	188 389.61	35.99	187 042.69	31.88
3	Medium	6300.65	1.12	10 771.85	2.06	14 268.02	2.43
4	Intense	16 572.43	2.94	15 229.11	2.91	14 688.56	2.50
		Rust					
2	Light	92 632.01	16.44	85 805.95	16.39	110 768.47	18.88
3	Medium	396.07	0.07	707.43	0.14	872.46	0.15
4	Intense	291.89	0.05				
		Leaf scald					
2	Light			566.69	0.11	213.74	0.04
3	Medium	107.20	0.02	383.83	0.07	147.98	0.03
4	Intense						

In the case of diseases, recommendations such as proper management and planting of resistant varieties, together with diversification with other field and forestry crops in the cane growing areas, have contributed to a reduction in the inoculum pressure in the ecosystem.

Behaviour of insect pests and rodents

Borers and rodents constitute the most harmful species to sugarcane in Cuba. In the period in which their presence was analysed (Medium + intense), the area of intense infestation did not exceed 7% of the sampled area for *Diatraea saccharalis* and 16% for rats, the latter maintaining a similar status as the one reported in previous years.

This result has been favoured by the recommendations and the campaigns of liberation of biological controls, as well as the elimination of rats in cane areas, infrastructures and towns nearby. The defoliators and elaterids have not shown attacks of significance (Table 2)

Table 2—National distribution of insects pests and rodents (acres).

Grade	Category	Borers					
		Area 2006	%	Area 2007	%	Area 2008	%
2	Light	165 895.29	29.43	193 304.45	36.93	201 495.49	34.34
3	Medium	28 328.72	5.03	32 865.43	6.28	28 380.72	4.84
4	Intense	34 544.12	6.13	25 481.89	4.87	12 501.67	2.13
		Defoliators					
2	Light	32 749.93	5.81	36 818.16	7.03	61 742.37	10.52
3	Medium	96.10	0.02	602.51	0.12	319.70	0.05
4	Intense					112.57	0.02
		Elaterids					
2	Light	18 580.75	3.30	26 358.50	5.04	37 001.81	6.31
		Rodents					
2	Light	68 868.09	12.22	81 850.02	15.64	71 200.85	12.13
3	Medium	18 980.03	3.37	25 759.42	4.92	20 560.08	3.50
4	Intense	71 329.85	12.66	61 427.85	11.73	74 084.53	12.63

In the case of borers and rodents, a reverse behaviour is observed, the bigger contribution to damage being from borers in the stools of the spring crop of that year, which is in accordance with results that have demonstrated that the succulence of new plantings induces the proliferation of insect pests.

From the environmental standpoint, a reduction of other detrimental agents was obtained as well as the prevention of exotics, which was made possible by the application of recommendations offered by the Service for the optimum varietal composition, the evaluation of the quality of the seed used for replanting plantations, and the activation of phytosanitary awareness with all of its components.

Chemical products are not included among the recommended control practices, except in the case of rodenticides due to the little availability and stability of biological control practices under field conditions.

Conclusions

- It was defined that the main biotic factors affecting the sugarcane crop in Cuba are: smut, rust, leaf scald, borer (*D. saccharalis)* and rodents.
- It was determined that, at the national level, the incidence of the levels of smut, leaf scald, borers and rodents did not surpass the medium level, whereas the incidence of damage by rust was low.

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LE SERVICE PHYTOSANITAIRE DE LA CANNE À SUCRE À CUBA

Par

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Résumé

LES RESULTATS obtenus de 2000 jusqu'à présent après l'implémentation et la généralisation du Service Phytosanitaire (SEFIT) sont présentés. Ce service a eu un impact positif sur lutte contre les nuisibles et en mitigeant les pertes de rendement. Il tient compte de la participation active du personnel et de sa compétence, la reconnaissance et l'enregistrement des nuisibles et la production du matériel de plantation sain tout en développant des partenariats pour la production des plantes saines et la lutte contre les nuisibles. Les mesures recommandées prennent en considération la biologie du nuisible et la protection de l'environnement. Le Service comprend une version automatisée, unique en son genre à Cuba, qui permet la prise de décision concernant la manière de gérer les organismes dangereux, l'épidémiologie des souches, les conditions de la culture et les cultivars en plantation industrielle. Il est aussi impliqué dans la réglementation des problèmes phytosanitaires. Le progrès accompli est présenté. Le support scientifique et technique offert par le National Sugarcane Research Institute (INICA) a contribué significativement en empêchant des pertes en sucre de 700 000 tonnes, (valeur marchande de US$216 933), uniquement par la maladie du charbon. De plus, il existe d'autres bénéfices comme la réduction du niveau des nuisibles, la prévention de l'introduction des organismes exotiques et une diminution dans l'utilisation des produits phytopharmaceutiques pour réduire l'incidence des ravageurs et des maladies.

SERVICIO FITOSANITARIO EN LA INDUSTRIA DE LA CAÑA DE AZÚCAR EN CUBA

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Resumen

SE PRESENTAN los resultados obtenidos desde 2000 hasta el presente sobre la la aplicación y la generalización del Servicio Fitosanitario (SEFIT). Este servicio ha gran tenido un impacto sobre la presencia y control de plagas y en la moderación de las pérdidas causadas por ellos en la producción de caña de azúcar. Tiene en cuenta la participación activa del capital humano inserto en el servicio, su proceso de calificación, el reconocimiento y registro de las plagas, la búsqueda de producción de semilla de calidad y el desarrollo de diferentes vínculos para obtener plantas sanas y control de las plagas. Las medidas recomendadas tienen en cuenta la biología y protección del medio ambiente. El servicio incluye una versión automatizada, único de su tipo en Cuba, que permite la toma de decisiones sobre el manejo integral de organismos nocivos y la consideración de los aspectos epidemiológicos de las cepas, las condiciones de los cultivos y cultivares comerciales. También participa en la regulación de los factores que presentan problemas fitosanitarios. Se presentan los avances en la organización de los servicios fitosanitarios en la caña de azúcar en nuestro país. Este servicio técnico y científico es ofrecido por el Instituto Nacional de Investigación de la Caña de Azúcar (INICA) y ha demostrado beneficios significativos mediante la prevención de las pérdidas de azúcar en más de 700 000 toneladas (con valor en el mercado de USD$ 216 933), debido sólo al carbón. Además, hubo otros beneficios, tales como la reducción de los índices y porcentajes de infestación por plagas, la prevención de la introducción de organismos exóticos y la reducción de las cantidades de productos de control biológico para disminuir la incidencia de plagas y enfermedades.