DRD—DEDINI REFINADO DIRETO (DEDINI DIRECT REFINED) IMPROVEMENTS IN REFINED AND CRYSTAL WHITE SUGAR PRODUCTION

By

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Abstract

In addition to its application in the production of granulated refined sugar directly from clarified cane syrup in sugar mills, the Dedini Direct Refined (DRD-Dedini Refinado Direto) can be applied as an improvement in white sugar plants and conventional refineries, allowing production of white sugar from syrups of very high colour. This paper describes the tests conducted with DRD applied to the clarification of high colour syrup obtained from the juice of a new variety of sugar cane (RB92579), widely planted in the northeast of Brazil, which has great productivity but characteristically produces a strongly coloured juice. A study of the relationship between the colour in the final crystal sugar or refined sugar and the colour of the syrup, comparing results obtained in several parts of Brazil and references in the literature, is also presented. This paper also points out the excellent performance of DRD in tests carried out in Brazilian northeast sugar mills, in which it successfully performed the decolourisation of several highly coloured syrups obtained from sugarcane mixtures with different RB92579 content.

Introduction

Between 2005 and 2007 Dedini Indústria de Base S/A (Olivério and Boscariol, 2006 and 2007) presented a new process for granulated refined sugar production directly from syrup, called Direct Refined Process (DRD- Dedini Refinado Direto) (Figure 1). One of the key factors of this process is the capacity of the resins used in this process to retain coloured compounds.

The Brazilian northeast sugar mills experience difficulties in the production of white crystal sugar when processing the new cane variety RB92579. It was considered that the DRD process could assist the mills to produce white sugar. Although this variety of sugarcane is highly productive for the conditions of this region, it has high quantities of coloured compounds that lead to the production of high colour syrups, and consequently, highly coloured crystals. Mantelatto (2005) presented a vast bibliographic review and a detailed study of the process of mother liquor migration to the crystal, correlated with the velocity of crystallisation. If the objective is to obtain white sugar from highly coloured syrup, it is evident that a syrup treatment to reduce the level of colour is necessary. The DRD process together with good sugar house procedures can be important tools to obtain low colour white crystal sugar.

This paper presents the results of DRD pilot plant tests running with the highly coloured syrup after clarification. Colour loading versus saturation curves and the performance of resin columns operating with syrup containing different percentages from the cane variety RB92579 are also discussed. Finally, correlations of crystal colour obtained as a function of syrup colour for sugar mills in different regions of the country are provided, which are compared with data in the literature, and with the sugar obtained from juice decolourised by the DRD process. A simulation of the use of the DRD process is presented, as a guide in the production of white crystal sugar (<150 IU) for highly coloured syrup.

Materials and methods

The DRD process: refined sugar without a refinery

A schematic of the DRD process is shown in Figure 1. It is designed to produce refined sugar directly from clarified syrup without the need to produce raw sugar and then remelt and recrystallise it as is the practice in a conventional refinery.

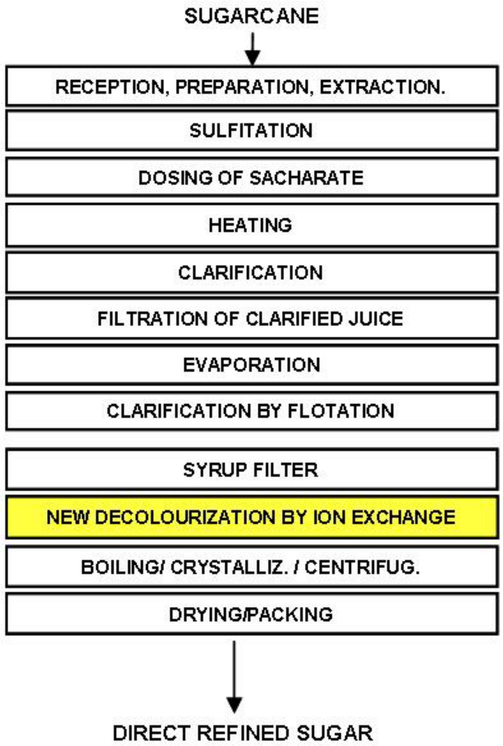

Fig. 1—Refined sugar production by the DRD process.

In the DRD process, the main unit operation is syrup decolourisation. This operation is performed by high capacity ionic exchange resins. To evaluate the behaviour of these resins in the decolourisation process of highly coloured syrup, tests were performed in a pilot unit, presented in Figures 2 and 3 at the sugar mills Usinas Caeté and União Indústria S/A respectively, located in São Miguel (AL) and Primavera (PE), both in the northeast of Brazil.

The steps involved in the decolourisation process were developed in partnership with Rohm and Haas. It comprises a system of three stages in series (DRD1, DRD2 and DRD3) of ionic exchange resins designed to work under the characteristic conditions of clarified syrup. The basic characteristics of the DRD resins are presented in Table 1.

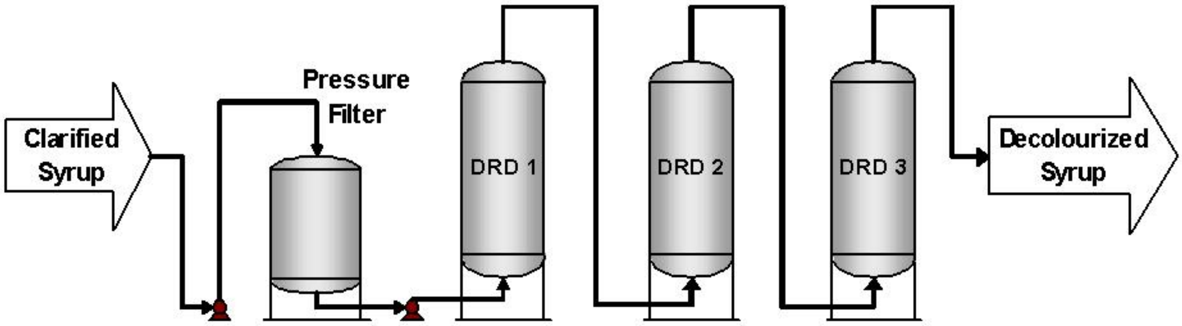

Fig. 2—Experimental scheme of the DRD process.

Fig. 3—Photograph of the DRD pilot plant.

Table 1—Basic characteristics of the ion exchange resin utilised in the DRD process.

Properties	DRD1	DRD2	DRD3
Matrix	Polystyrene	Acrylic	Polystyrene
Functional group	Sulfonic acid	Quaternary ammonium	Quaternary ammonium
Ions form as shipped	Na^+	Chloride	Chloride
Total exchange capacity	≥1.8 eq/L resin (Na^+ form)	≥0.8 eq/L resin (Cl^- form)	≥1.0 eq/L resin (Cl^- form)
Moisture holding capacity	47–54% (Na^+ form)	66–72% (Cl^- form)	58–64% (Cl^- form)

Operation

The pilot plant operated with clarified syrup with a brix of around 60 to 65 and 70–75ºC. Firstly, the syrup passed through a sand pressure filter in down flow at a pressure around 2.5 bar, to remove gross particles as well as turbidity compounds to avoid plugging of the resin beds with suspended solids. The filtered syrup passed through the three columns in the up flow direction. The purpose of the first resin column is to soften the syrup, the second to perform decolourisation and the third to perform final polishing to guarantee syrup of the necessary quality for efficient crystallisation. The pilot plant operated with a mean flow of 350 L/h with operating cycles at around 30 h. At the end of each cycle, the resins went through a regeneration process with caustic brine solution (10% NaCl and 0.02% NaOH) and returned to operate in a new decolourisation cycle. The resins were submitted to various operating cycles, in which it was possible to establish that their efficiency in the removal of colour was maintained at around 50 to 70%.

At the sugar mill Usina Caeté, the influence of the cane variety RB92579, a source of high colour juice as seen in Figure 4, on the performance of the system of resins was evaluated.

Fig. 4—Clarified juice from cane variety RB92579.

Results and conclusions

Figure 5 shows the influence of the quantity of cane variety RB92579 on the syrup colour. It can be observed that the increase in colour of the syrup can be linked with the proportion of RB92579 processed. Figure 6 shows the influence of the quantity of cane variety RB92579 on the A-sugar colour. It can also be observed in Figure 6 that the increase in colour of the A sugar is partly due to the increase in the cane RB92579 processed and the high level of colour in the syrup. The high and variable colour loading makes it difficult to maintain the colour of the A white sugar below 150 IU. It was proposed to use the DRD process to assist the production of A white sugar with a consistent colour level equal to or below 150 IU. The results of using the DRD process to reduce syrup colour during the processing of RB92579 are presented.

Tables 2 and 3 present an example (cycle 14) of DRD syrup decolourisation in the Caeté Sugar and Alcohol Mill. The DRD pilot plant ran for a total of 22 cycles. The DRD system operated with the press sand filter filled with sand, followed by the cationic column (DRD1), first anionic column (DRD2) and a second anionic column (DRD3).

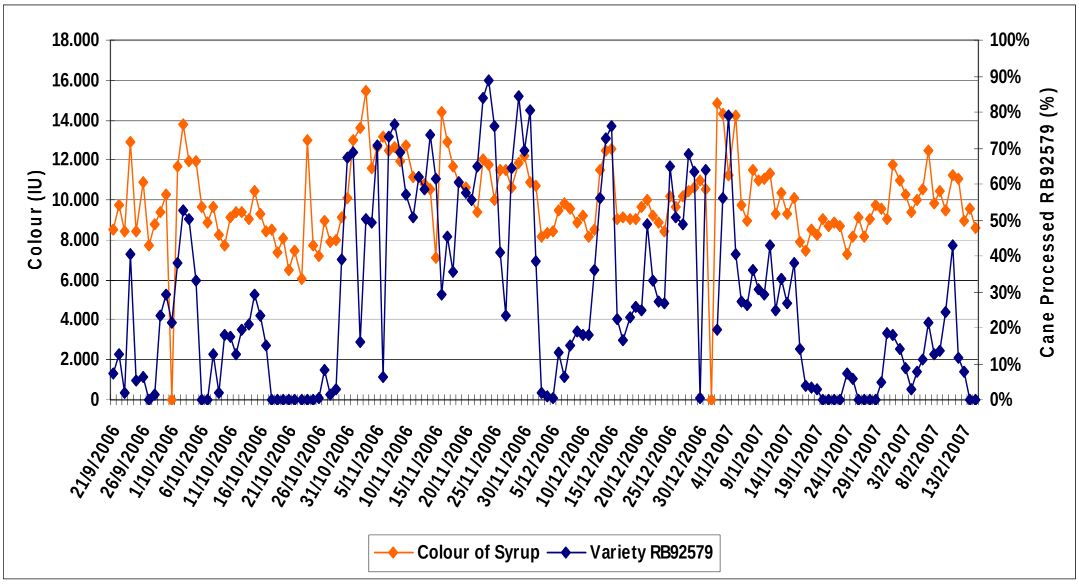

Fig. 5—Influence of the quantity of cane variety RB92579 processed on the syrup colour during 2006 and 2007 season, Caeté Sugar and Alcohol Mill.

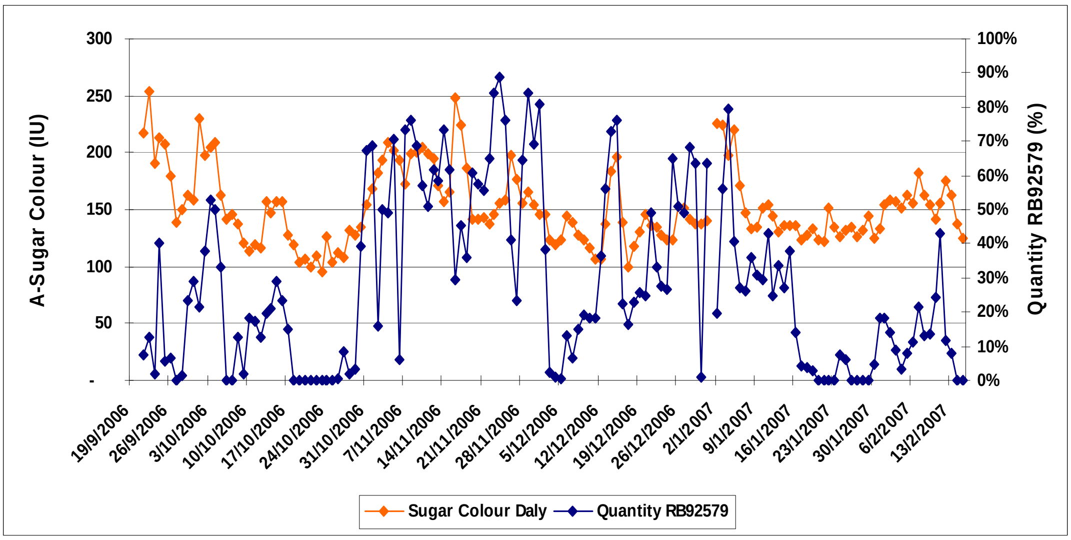

Fig. 6—Influence of the quantity of cane variety RB92579 processed on the A sugar colour during 2006 and 2007 seasons, Caeté Sugar and Alcohol Mill.

Table 2—Data for DRD syrup processing at Caeté Sugar and Alcohol Mill, samples 52 to 56, cycle 14 of 22.

Variety	10/18/2008		0/19/2008	
	Tonnes	%	Tonnes	%
RB 92579	1538	16.72	1374	14.73
SP 813250	2922	31.74.	1477	15.84
SP 791011	2050	22.28.	4366	46.81
SP 716949	145	1.58		
SP 784764	583	6.34		
VAT90-212	24	0.26		
SP 813250ED	230	250	2138	16.19
RB 867515	1663	18.07	601	6.44
N I:	47	0.52		
NI: It's not informed				

Start: 16:40 Date: 10.18 2007	Composite sample
End: 19:50 Date: 10 18 2008	

Sample 52						
Analysis	FO	F1	F2	F3	F4	Colour removal
Brix (%)	58.00	54.40	53.20	51.20	49.60	
pH	5.74	7.68	7.65	7.81	6.58	
Colour (IU)	10 118	7347	7111	5317	2793	72.40%
Optical density (420 nm)	1101	745	594	522	727	
Purity	84.05	85.03	85.38	85.41	86.10	
Polarisation	48.75	46.26	45.42	43.73	42.70	

Sample 55						
Analysis	FO	F1	F2	F3	F4	Colour removal
Brix%	55.60	56.40	55.20	53.60	52.00	
pH	5.74	5.89	5.90	6.16	6.80	
Colour (IU)	9650	9928	9663	9604	6400	33.68%
Optical density (420 nm)	318	73	162	328	182	
Purity	90.91	89.37	88.20	88.77	90.15	
Polarisation	50.54	50.41	48.69	47.58	46.88	

Start: 20:30 h	Date: 01/11/2008	Composite sample
End: 23:00 h	Date: 01/11/2008	

Sample 53						
Analysis	FO	F1	F2	B	F4	Colour removal
Brix%	62.40	48.40	52.00	52.00	54.80	
pH	5.85	7.07	6.87	7.52	7.63	
Colour (IU)	9425	8855	8591	8341	4643	50.74%
Optical density (420 nm)	966	766	655	° 593	879	
Purity	84.22	83.61	83.64	83.45	83.83	
Polarisation	52.55	40.47	43.49	43.40	45.94	

Start 20:30 h	Date: 01/12/2008	Composite sample
End: 23:00 h	Dale: 01/12/2009	

Sample 56						
Analysis	FO	F1	F2	F3	F4	Colour removal
Brix%	46.40	53.20	55.20	56.00	55.60	
pH	5.77	5.91	5.88	6.19	6.73	
Colour (IU)	10 292	9605	9284	8779	5612	45.47%
Optica density (420 nm)	959	229	493	68	202	
Purity	85.82	88.35	88.38	88.28	88.24	
Polarisation	39.85	47.00	48.79	49.44	49.06	

Start: 01:00 h	Date: 01/11/2008	Composite sample
End:01:00 h	Date: 01/11/2008	

Start: 01:00 h	Date: 01/12/2008	Composite sample
End: 03:00 h	Date: 01/12/2009	

Sample 54						
Analysis	FO	F1	F2	F1	F4	Coloul removal
Brix%	52.80	53.20	56.80	58.00	55.60	
pH	5.88	6.17	6.24	6.53	7.05	
Colour (IU)	11 110	10 006	9594	9100	5388	51.50'%
Optical density (420 nn)	885	570	635	591	728	
Purity	88.68	88.91	88.36	88.46	89.66	
Polarisation	46.83	47.30	50.19	51.31	49.85	

Table 3 combines the colour data for samples 52 to 56 of Table 2 and includes the volumes of syrup passing through the pilot plant. The abbreviations in both tables include:

- V = syrup feed volume (cumulative);
- F0 = colour of syrup feed to the sand press filter;
- F1 = output syrup colour from the sand press filter (filled with sand);
- F2 = output syrup colour from cationic column DRD1 (filled with 200 L resin);
- F3 = output of first anionic column DRD2 (filled with 200 L resin); and
- F4 = output of second anionic column DRD3 (filled with 150L of DRD3 resin).

Table 3—Variation of colour as a function of volumes of syrup feed based on the data of Table 2.

Volume of ion exchange resin (L)				200	200	150
	V (L)	FO (IU)	F1 (1U)	F2 (IU)	F3 (IU)	F4(IU)
	320					
	1009	10 118	7347	7111	5317	2793
CYCLE 14	2048	9425	8885	8591	8341	4643
	2704	11 110	10 006	9594	9100	5388
	3976	9650	9928	9663	9604	6400
	5566	10 292	9605	9284	8779	5612

Figure 7 illustrates the reduction in colour as the syrup progresses through the DRD process. Clarified syrup from a flotation clarifier with a colour of 8856 IU was sampled as it passed through each resin column. In this example, the colour of the final decolorised syrup was 1846 IU, a removal efficiency exceeding 70%.

Fig. 7—Variation in syrup colour through the decolourisation steps of the DRD process. F0: Clarified syrup at inlet to filter (8856 IU); F1: Outlet of sand filter (partially filled with 150 L each of resins DRD2 and DRD3), (6647 IU); F3: Outlet of column DRD2 (200 L of anionic resin), (3808 IU); F4: Outlet of column DRD3 (150 L of anionic resin), (1846 IU)

Table 4 shows example data (cycle 2) for the DRD plant decolourising syrup at União Indústria Sugar and Alcohol Mill.

Table 4—Data for DRD syrup processing at União Indústria Sugar and Alcohol Mill – Samples 08 to 13, Cycle 2 of 25. DRD Experiments, Uni6o Industria

Variety	1/11/2008		1/12/2008	
	Tonnes	%	Tonnes	%
RB 92579	396	7.17	396	7.17
SP 813250	355	6.44	355	6.44
SP 791011	96	1.75	96	1.75
SP 716949	0	0.00	0	0.00
SP 784764	2138	38.76	2138	38.76
VAT90-212	0	0.00	0	0.00
SP 813250ED	0	0.00	0	0.00
RB 867515	0	0.00	0	0.00
N1	2530	54.12	2530	45.88
NI: It is not informed				

Start: 16:30 End: 18: 30	Date: 01/1/12008 Date: 01/11/2008		Composite sample										
Sample 08							Sample 11						
Analysis	FO	F1	F2	F3	F4	Colour removal	Analysis	FO	F1	F2	F3	F4	Colour removal
Brix%	52.00	58.00	57.20	55.20	46.40		Brix%	51.4	55.6	52.4	53.2	53.6	
pH	6.4	8.6	8.8	8.4	9.1		pH	6.5	7.0	7.1	8.7	8.7	
Colour (IU)	12947	7956	8217	4158	3156	86.77%	Colour (IU)	11775	8280	8925	5965	4554	61.32%
Optical density (420 nm)							Optical density (420 nm)	743	423'	356	234	189	
Purity	89.50	93.51	93.49	94.20	90.73		Purity	87.22	87.63	90.68	90.23	90.90	
Polarisation	46.54	54.24	53.47	52.00	42.10		Polarisation	44.83	48.72	47.51	48.00	48.72	
Start: 20:30 h	Date: 01/11/2008		Composite sample				Start: 20:30h	Date: 01/12/2008		Composite sample			
End: 23:0011	Date: 01/11/2008(						End: 23:00 h	Date: 01/12/2009					
Sample 09							Sample 12						
Analysis	FO	F1	F2	F3	F4l	Colour removal	Analysis	FO	F1	F2	F3	F4	Colour removal
Brix%	59.20	54.40	56.80	54.40	58.00		Brix%	56.0	54.0	53.6	53.20	54.4	
pH	6.5	7.7	8.4	8.7	8.8		pH	6.4	6.3	6.5	8.2	8.6	
Colour (IU)	11282	8831	7518	4192	3235	71.33%	Colour (IU)	13819	12025	11945	9931	6764	51.05%
Optical density (420 nm)							Optical density (420 nm)	623	386	351	171	190	
Purity	87.24	88.53	88.16	'89.58	88.83		Purity	87.21	86.48	86.94	88.20	89.15	
Polarisation	51.64	48.16	50.07	48.73	51.52		Polarisation	48.84	46.70	46.60	46.92	48.5	
Start: 01:00 h	Date: 01/11/2008		Composite sample				Start: 01:00 h	Dale: 01/12/2008		Composite sample			
End: 03:00 h	Date: 01/11/2008						End: 01:00 h	Date: 01/2/2009					
Sample 10							Sample 13						
Analysis	FO	F1	F2	F3	F4	Colour removal	Analysm	FO	F1	F2	F3	F4	Colour removal
Brix %	63.60	62.40	62.00	62.40	64.80		Brix%	49.2	54.0	50.4	49.6	49.6	
pH	5.81	5.77	5.69	6.42	6.76		pH	6.6	6.6	6.4	8.0	8.4	
Colour (iu)	9773	13816	14649	12984	7531	76.5%	Colour (IU)	14802	10246	13104	10054	6719	54.6%
Turbidity (420 nm)	1175	467	450'	446	1396		Turbidity (420 nm)	676'	371'	320	185	130	
Purity	85.61	79.82	77.99	78.88	81.96		Purity	90.1	88.72	89.82	90.93	91.11	
Polarisation	54.45	49.81	48.36	49.22	53.11		Polarisation	44.32	47.91	45.27	45.10	45.19	

The DRD pilot plant ran for a total of 25 cycles. In this case, the DRD system operated with the press sand filter filled with sand and 150 L of DRD2 and 150 L of DRD3 anionic resin, followed of cationic column (DRD1), first anionic column (DRD2) and a second anionic column (DRD3). This option was possible because the factory had a syrup belt press filter after the syrup clarifier. Thus, the syrup feed in the DRD process had a low level of turbidity and solids in suspensions. This was done to aid syrup purification since the colour of the raw syrup was very high.

Table 5 was compiled with colour data from Table 4 together with the volumes of syrup fed through the columns.

Table 5—Variation of colour as a function of volumes of syrup feed. V = volumes of syrup feed; F0 = colour of syrup input to sand press filter; F1 = output of sand press filter (150 L DRD2 resin and 150 L DRD3 resin), F2 = output of cationic column (200 L DRD1), F3 = output of first anionic column (200 L DRD2), F4 = output of second anionic column (150 L DRD3 resin).

Volume of ion exchange resin (L)			150 DRD2 + 150 DRD3	200	200	150
	V (L)	Fo (IU)	F1 (1U)	F2 (IU)	F3 (IU)	F4 (IU)
Cycle 2	258					
	714	11 282	8831	7518	4192	3235
	1854	13 889	9478	9560	6163	3259
	3222	11 775	8280	8925	5965	4554
	3734	13 819	12 025	11 945	9931	6764
	4646	14 802	10 246	13 104	0054	6719

The graphs in Figures 8, 9, 10, and 11 present the results correlating the colour load absorbed by the resin system versus the volume of syrup fed into the columns in relation to the volume of resin, denominated by bed volumes (BV), and syrup colour as a function of the BVs in one of the cycles studied during the trials at Caeté Sugar and Alcohol Mill and União Indústria Sugar and Alcohol Mill, respectively.

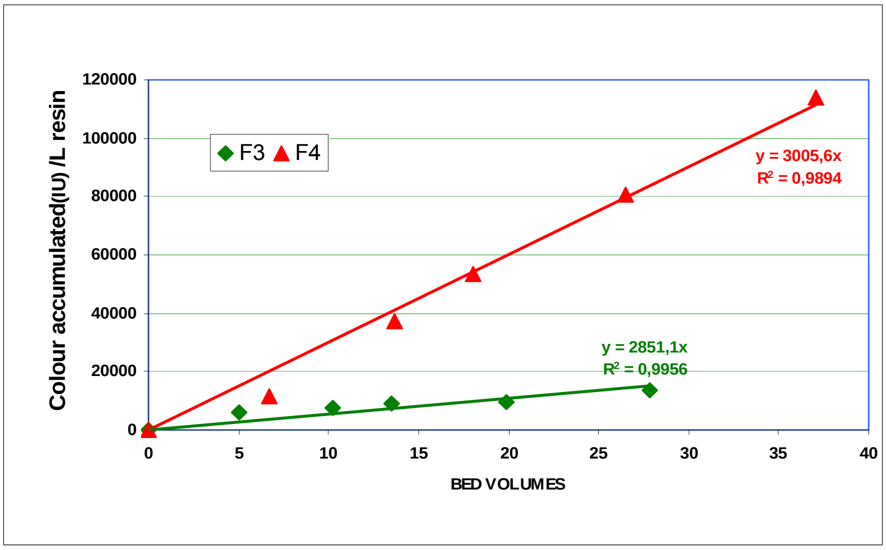

Fig. 8—Colour load accumulated in the ion exchange resins as a function of the bed volumes fed at Caeté Sugar and alcohol Mill. F3 = outlet of column DRD2, F4 = outlet of column DRD3.

Considering that the resins can operate up to 60–70% of saturation (see the load capacity of resins in Table 1), in the case of anionic resins on DRD it is possible, as can be seen in Figures 8 and 10, to operate with a colour load which could reach a level as high as 60 000–65 000 IU. This demonstrates the capacity to bear high rates of colour adsorption, even for syrup containing high initial colour loads.

As seen in Figures 8 and 10, the colour accumulated in the resins conforms to a linear behaviour with the BV fed to the columns. The different slopes of the curves indicate different load factors depending on the characteristics of the resin and also the affinity between colour compounds and functional group of the resins. The Figures thus obtained were used to design the system on an industrial scale.

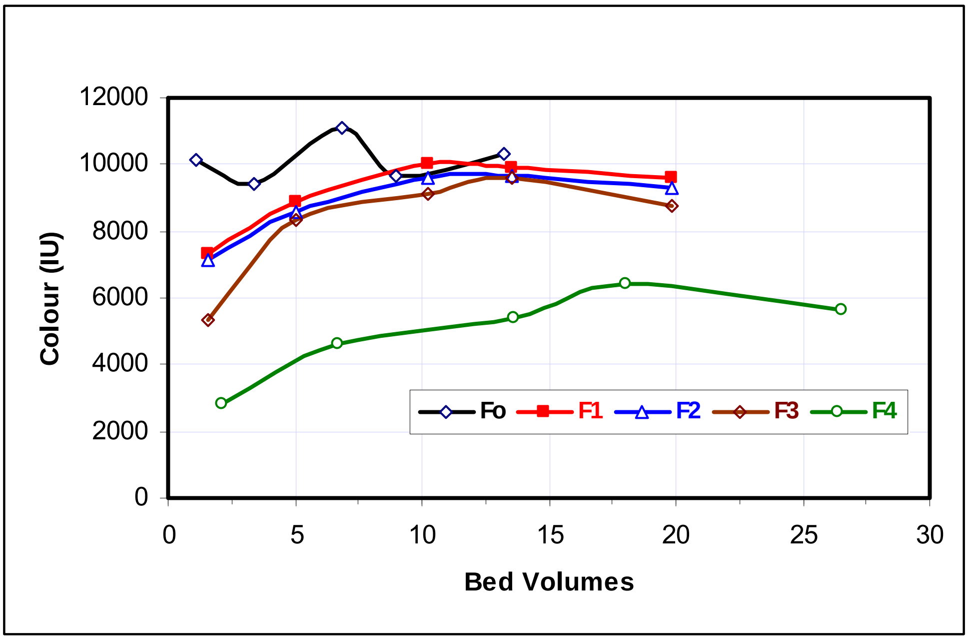

Fig. 9—Colour of syrup as a function of bed volumes passed through the ion exchange columns at Caeté Sugar and Alcohol Mill. F0 = clarified syrup colour; F1 = outlet of filter; F2 = outlet of column DRD1; F3 = outlet of column DRD2; F4 = Outlet of column DRD3

In Figure 12, the colour removal efficiency values of the system are correlated as a function of the proportion of the cane variety RB92579 in the cane being supplied to the factory. As indicated by the data, the extra colour loading introduced by RB92579 has no effect on the colour removal efficiency of the resins. Moreover, it was observed that the resin system was capable of maintaining a removal efficiency in the range of 50 to 70%, even when processing this variety of cane with higher clarified juice colour.

It was shown that the DRD-Dedini system could be used successfully both as an aid in the production of white sugar and for the production of refined sugar by using clarified syrup as the feed to the decolourisation process.

To compare the levels of removal attained in the various colour removal processes in crystallisation, the colour of the sugar obtained was regressed against the colour of the syrup or liquor of the Brazilian sugar mills as follows:

(1) DRD System (Olivério and Boscariol, 2006 and 2007), refined sugar obtained from decolourised syrup: $y = 0.007 \times + 17.65$;

(2) Thompson *et al*. (2006) refined sugar;

(3) A white crystal sugar – Us. Mogiana: $y = 47.73 . \exp(1.31 .10^{-4}. \times)$;

(4) White crystal sugar – Us Sta Isabel: $y = 19.96 . \exp(2.10.10^{-4}. \times)$;

(5) White crystal sugar – Us. Caeté: $y = 46.88 . \exp(0.98.10^{-4}. \times)$;

(6) White crystal sugar – Us. União Indústria: $y = 42.20 . \exp(1.31.10^{-4}. \times)$;

(7) Controlled cooling crystallisation of liquor obtained from raw sugar (VHP and VVHP) and cane syrup, (Mantelatto, 2005): $y = 0.0214 \times + 8.80$.

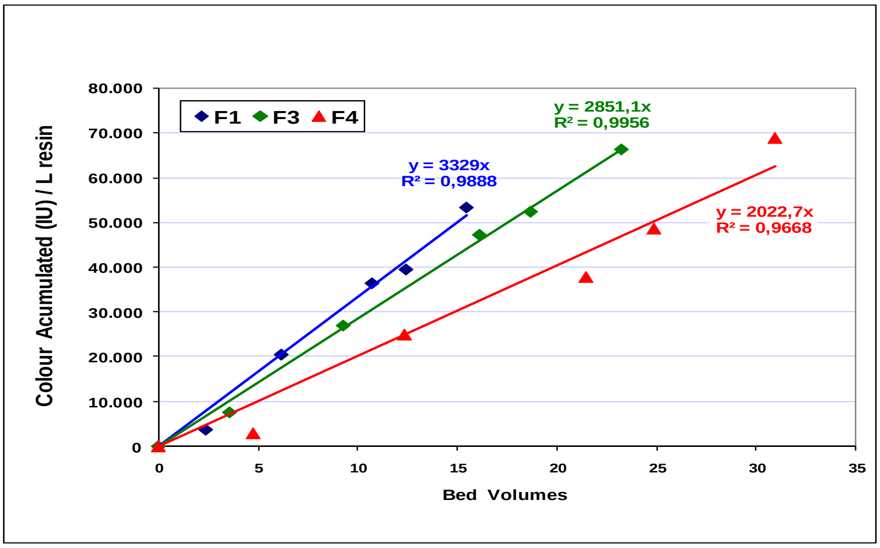

Fig. 10—Colour load accumulated in the ion exchange resins as a function of the bed volumes fed at União Sugar and Alcohol Mill. F1 = outlet of column DRD1; F3 = outlet of column DRD2; F4 = outlet of column DRD3.

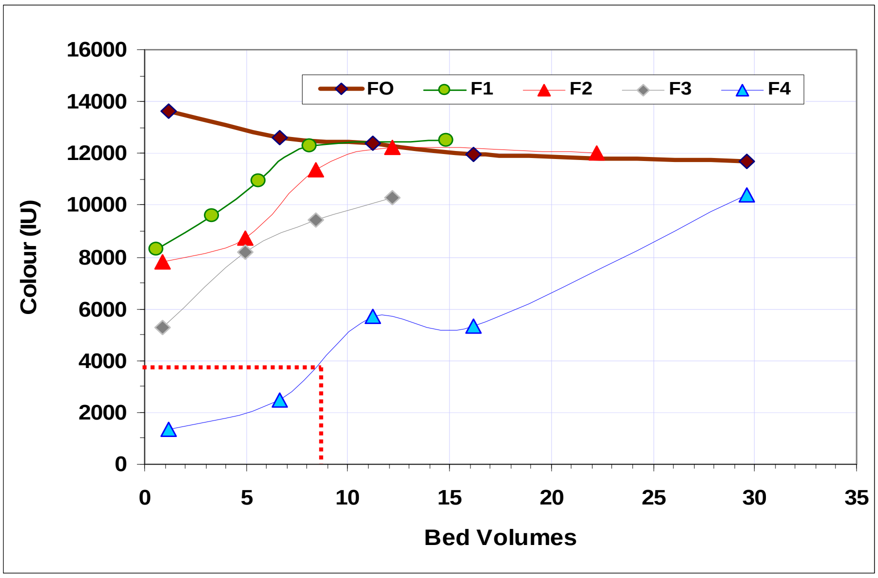

Fig. 11—Colour of syrup as a function of bed volumes passed through the ion exchange columns at União Sugar and Alcohol Mill. F0 = clarified syrup colour; F1 = outlet of filter; F2 = outlet of column DRD1; F3 = outlet of column DRD2; F4 = Outlet of column DRD3.

The models were obtained considering the moving average of three points. As can be observed from the data presented in Figure 13, the colour removal factor in the crystallisation of juice coming from the DRD system was excellent, when compared with the other systems presented. As an example, the curve corresponding to União Indústria in Figure 13 indicates that the colour of the syrup must be about 8000 to 9000 IU to produce white crystal with a colour of 150 IU.

Finally, DRD technology proved to be an improvement to the white sugar process, even for high colour syrups. From the study conducted, in addition to the studies previously conducted (Olivério and Boscariol, 2006 and 2007), it could be concluded that the DRD system can be advantageously used both in the production of granulated refined sugar and for the production of white crystal sugar (colour < 150 IU).

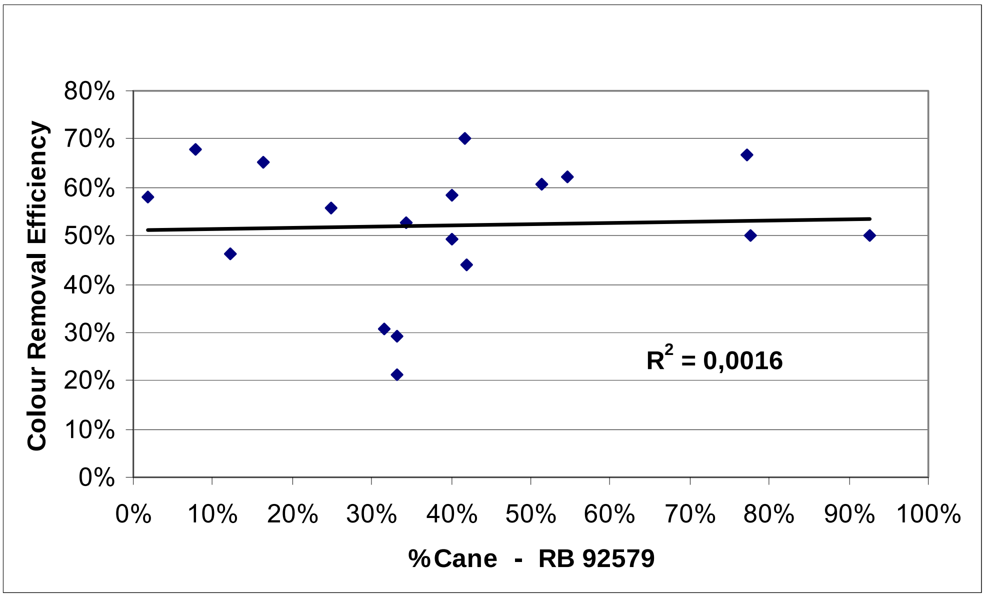

Fig. 12—Overall efficiency of colour removal by the DRD-Dedini system as a function of the proportion of cane variety RB92579 processed at Caeté Sugar and Alcohol Mill.

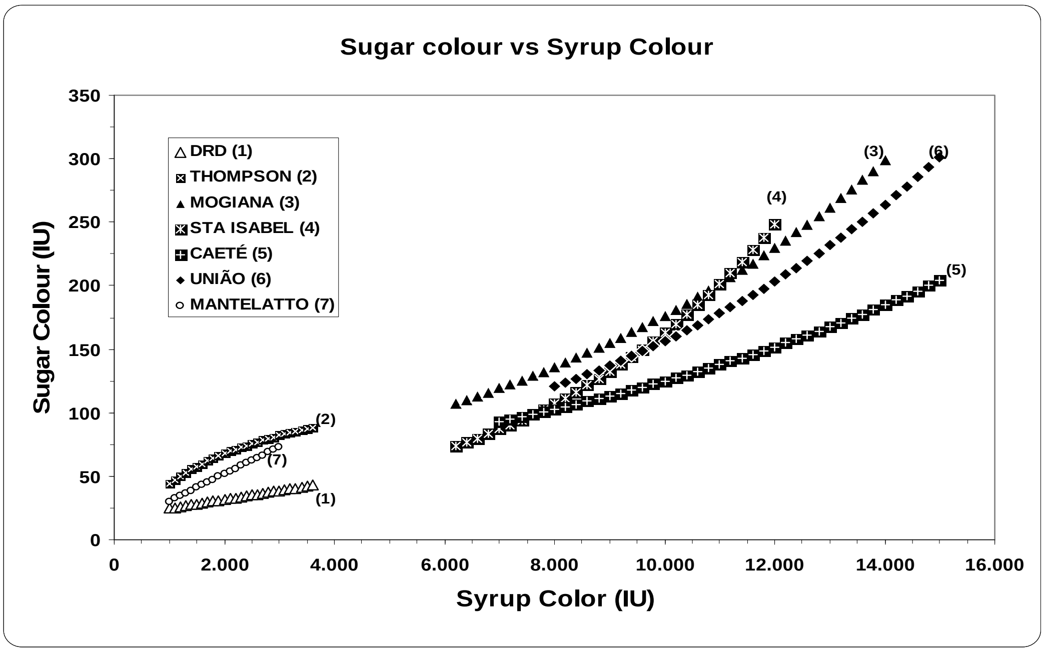

Fig. 13—Variation in the colour of sugar as a function of the colour of syrup feed to the crystallisation process: DRD, Thompson *et al*. (2006), Mogiana Sugar and Alcohol Mill, Sta Isabel Sugar and Alcohol Mill, Caeté Sugar and Alcohol Mill, União Industria Sugar and Alcohol Mill and Mantelatto (2005).

REFERENCES

Mantelatto, P.E. (2005). Estudo do processo de cristalização de soluções impuras de sacarose de cana-de-açúcar por resfriamento, Dissertação de mestrado apresentado ao Programa de Pós-graduação em Engenharia Química da Universidade Federal de São Carlos, 230 p., São Carlos, 2005.

Olivério, J.L. and Boscariol, F.C. (2006). DRD DEDINI Direct Refined. The refined sugar without a refinery. International Sugar Journal, 108 (1289): 239–246.

Olivério, J.L. and Boscariol, F.C. (2007). DRD DEDINI Direct Refined. The refined sugar without a refinery. Proc. Int. Soc. Sugar Cane Technol.,(CD-ROM), 26: 10 p.

Thompson, P., Fry, P. and Hasrajani, N. (2006). Thoughts on refinery boiling schemes. Zuckerind., 131: 179.

DRD—DEDINI REFINADO DIRETO (DEDINI DIRECT RAFFINÉ) AMÉLIORATIONS POUR LA PRODUCTION DE SUCRE RAFFINÉ ET DE SUCRE CRISTAL BLANC

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MOTS-CLEFS: Sucre Crystal Blanc, Sucre Raffiné.

Résumé

EN PLUS de son application pour la production de sucre raffiné directement à partir de sirop de canne clarifié dans les usines a sucre, le Dedini Direct Raffiné (DRD-Dedini Refinado Direto) peut être introduit pour améliorer la production du sucre blanc et l'opération des raffineries conventionnelles, permettant la production de sucre blanc à partir de sirops de couleurs très élevées. Ce papier décrit des essais concernant l'application du DRD pour la clarification de sirops de hautes couleurs obtenus à partir d'une nouvelle variété de canne (RB92579), populaire dans le nord-est du Brésil, qui a un bon rendement mais produit un jus fortement coloré. Une étude de la relation entre la couleur du cristal de sucre ou du sucre raffiné et celle du sirop, tout en comparant les résultats obtenus dans plusieurs régions du Brésil et les références dans la littérature, est présentée. Ce document souligne également l'excellente performance du DRD pendant des tests effectués dans les usines du Nord-est brésilien; le DRD a permit une bonne décoloration de sirops fortement colorées, obtenus à partir de cannes contenant différents pourcentages de B92579.

DRD—REFINADO DIRECTO DEDINI MEJORAMIENTO EN LA PRODUCCIÓN DE AZÚCAR BLANCO Y REFINADO

Por

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PALABRAS CLAVE: Azúcar Blanco,
Azúcar Refinado Directo.

Resumen

ADEMÁS de su aplicación en la producción de azúcar refinado directamente de meladura clarificada, el Refinado Directo Dedini (DRD-Dedini Refinado Direto) puede ser aplicado como un mejoramiento en las plantas de azúcar blanco y en las refinerías convencionales, permitiendo la obtención de azúcar blanco a partir de meladuras de color muy alto. Este artículo describe las pruebas realizadas con el DRD aplicado a la clarificación de meladura de alto color obtenida del jugo de una nueva variedad de caña (RB92579), sembrada ampliamente en el noreste de Brasil con alta productividad pero que produce jugo con alto color. Se presenta también un estudio de la relación entre color del azúcar blanco y refinado y el color de la meladura, comparando con los resultados obtenidos en varias partes de Brasil y con los reportados por la literatura. También se señala el excelente desempeño del DRD en pruebas realizadas en ingenios del noreste brasilero, donde se obtuvo exitosamente la decoloración de varias meladuras altamente coloreadas obtenidas de mezclas de caña con diferentes contenidos de RB92579.