

Tea Market Update

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Ceylon Tea exports to Iran suffered heavily as a result of that country's protectionism and fresh U.S. sanctions

Globalization has not only brought the whole world into a global village but it has also paved the way for various countries to trade with each other. Trade protectionism is re-emerging as a controversial tactic among policymakers and economists in enhancing a nation's economic well-being. Free trade also seeks to stimulate economic growth and wealth creation within a nation's borders.

In order to understand trade protectionism, it is necessary to investigate the reasons and the resulting repercussions.

The objective of trade protectionism in respect of Iran it's vital economic interests such as key agricultural industries, important services, other commodities, and employment. Iran produces only 20 Million kilograms of tea the most but planning to protect their tea industry imposing direct restriction. Sri Lanka exported 27 Million Kilograms of Ceylon Tea to Iran in year 2017. For the year 2018, first seven months totaled 13 Million Kilograms and Exporters are hopeful of exporting 20-22 Million Kilograms of Ceylon Tea to Iran this fiscal year. As a result of this 25% drop in volumes, and tippy tea prices at Colombo Tea Auction declined with other liquoring grades.

Ceylon Tea exporters have started to feel the heat from the US sanctions on Iran. Most of the tea exporters said new contracts are being delayed and the tea trade is bracing for a hit as tea market in Iran will become expensive as it may have to be routed through Dubai or other Middle Eastern countries. Alongside again, there are problem facing bankers who deal with Iran.

Iran is a major market for Ceylon Tea. At present, shipments for old contracts are going to Iran through Bandar Abbas port. Iranian President Hassan Rouhani renewed the threat, saying that if sanctions blocked Iran's crude oil exports, the rest of the Middle East's exports through Hormuz straight would be in danger as well. Concurrently many upheavals among the Middle East occurred. Thus, there are delays in new import and exports contracts. So the entire Sri Lankan trade is worried about their tea shipments as well as due payments by Iran parties.

US sanctions can only affect dollar trade. In that case, Euro or other local currencies can be used for trading. However the blockage on the banking system is the biggest problem.

General Overview

Economy

The CBSL reports reveals that, second quarter merchandise exports increased around 6.3% during consecutive months starting from April. Concurrently, import expenditure increased by 12% in consecutive months of second quarter due to higher imports of personnel vehicles and petroleum import bill. In addition to personnel vehicles and petroleum, investment goods imported made further pressure on foreign reserves. As a result, the deficit of external trade bill could not be covered by earnings from tourism and inflows from worker remittances. Hence, on import pressure, Rupee weakened by 5% for the first six months, 2018. Therefore, the export industry received a cushioning effect on the Rupee earnings, but consumers paid heavy bills for import goods and it resulted a recession in the economy.

Tea Industry

Tea production has suffered with heavy rains in all elevations and quality deteriorating. Thus average prices at Colombo auction declined. A similar decrease was noticed in the exports.

MRL issue in Japan Tea Market, escalation of the Iranian problem due to fresh US sanctions and Turkey currency devaluation had a major negative effect in the Ceylon Tea exports during this quarter.

The following tea factories fetched highest average price in orthodox category.

Elevation	Fac. Nom.	Fac. Name	Rs/Kg
H	MF0647	UDA RADELLA	675.24
M	MF0608	CRAIGHEAD	664.26
L	MF1410	Gunawardena	732.83

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Tea Production

**Table 1 - Total and Monthly Tea Production
January-June 2018/2017 (Units :MT)**

	2018	2017	Difference	Change %
January	24,543	21,686	2857	13.17
February	21,183	18,613	2570	13.81
March	28,608	26,577	2031	7.64
April	28,018	32,945	-4926	-14.95
May	32,821	29,717	3104	10.44
June	23,031	27,240	-4209	-15.45
Total	158,205	156,778	1426	0.91

Tea production of Sri Lanka's decreased in April and June due to gloomy conditions with heavy rains in mid country. Tea production in June registered 23.03 million kilograms was the lowest in recent years as against 27.24 million kg in the same month last year. The output in the first six months has edged to 158.2 million kg from 156.8 million against in the same period last year with an increased crop expected by last quarter 2018.

Table 2 - Cumulative tea production according to elevation and category till June 2018 (Units :Mkg)

Category	Jan-June (MKg.)		Change	
	2018	2017	Qty (MKg.)	%
Elevation				
High	36.12	35.86	0.26	0.72
Medium	24.37	24.21	0.17	0.69
Low	97.71	96.71	1.00	1.04
Total	158.20	156.78	1.43	0.91
Processing Method				
Orthodox	144.60	144.70	-0.10	-0.07
CTC	12.21	10.57	1.64	15.54
Green Tea	1.40	1.52	-0.12	-7.62
Total	158.20	156.78	1.43	0.91

The above table 2. depicts the cumulative production compared with the 2017 quantities, It is evident from the figures that the production of CTC tea category maintained a notable increase of volumes while orthodox and Green tea categories registered a slightly drop in volumes as against corresponding period of last year.

**Table 3 – Distribution of Tea Production
January-June 2018/2017 (Units: MKg)**

Sector	2018 - Jan to June		2017 - Jan to June		% Change
	(Qty MKg.)	%	(Qty MKg.)	%	
Private	101.52	64.17	100.45	64.07	1.06
Plantation Co.	53.67	33.92	53.95	34.41	-0.52
Public	3.02	1.91	2.37	1.51	26.99
Total	158.20	100.00	156.78	100.00	0.91

Sector wise tea production in first half of 2018 validates the usual pattern in which private sector, consisting mainly of smallholdings, dominating the tea production while public sector taking a back seat. This is revealed in the table 3.

Table 4 - District wise tea production comparison as at June 2018 /2017(MT)

Admin District	2018	2017	Growth
Ratnapura	34,895	35,608	-713
Nuwara Eliya	32,959	31,917	1042
Galle	22,265	21,732	533
Matara	18,677	18,877	-200
Kandy	17,854	17,582	272
Badulla	14,551	15,629	-1078
Kalutara	10,411	10,192	220
Kegalle	5,342	4,176	1166
Matale	788	641	147
Colombo	390	337	53
Hambantota	73	88	-15
Total	158,205	156,778	1,426

With new cultivation's and fair weather in Kegalle and Galle districts recorded fairly better crop compared to last year. Despite the crop losses in Rathnapura, the district registered the highest production while Nuwaraeliya was placed the second for the first six months in 2018. Accordingly annual crop figure is estimated to surpass 300million Kilograms.



Tea Marketing

Declining of Colombo tea auction prices during the second quarter is normal general as we experienced peak period in country's tea production. The prices fetched per kilogram has changed from general decline to a more rapid decrease due to external forces like US sanctions on Iran and Turkey economic crisis. As a result, averages of Low grown leafy grades as well as tippy grades fell compared to a last year.

Table 5 –Teas Sold and prices fetched in second quarter 2018/2017 Unit: Qty-Mkg, Price: Rs/Kg

Elevation	2018 - April to June			2017 - April to June		
	Qty (MKg)	Price (SL Rs)	Price (US \$)	Qty (MKg)	Price (SL Rs)	Price (US \$)
High	17.25	532.30	3.38	18.55	564.1	3.70
Medium	13.23	516.84	3.28	13.65	579.2	3.80
Low	47.05	612.12	3.88	45.11	659.6	4.33
Total	77.54	578.10	3.67	77.31	622.5	4.09

When analyzing the respective elevation averages for second quarter 2018, High Grown at Rs. 532.30 have shown a loss of Rs. 31.89 against Rs. 564.19 of April-June 2017. Mediums too averaging Rs. 516.84 show a substantial loss of Rs. 62.41 against Rs. 579.25 of April-June 2017. Meanwhile, Low Grown at Rs. 612.12 has also shown a loss of Rs. 47.52 against Rs. 659.64 in second quarter 2017. It is important to note that these averages show a larger drop in USD terms compared to the corresponding period of 2017.

Table 6 – First half Colombo Tea Auction sales comparison 2018/2017 (Rs/Kg)

Sub District	January to June 2018			
	2018	2017	Price change per kg	Change %
Nuwara Eliya	594.42	583.92	10.50	1.80
Westerns (8 areas)	584.81	595.48	-10.67	-1.79
Mediums(9 areas)	540.91	566.74	-25.83	-4.56
Uda Pussellawa(2 areas)	523.99	554.09	-30.10	-5.43
Uvas(8 areas)	551.35	584.79	-33.44	-5.72
Low Growns (10 areas)	633.34	640.43	-7.09	-1.11
Average price	603.59	615.32	-11.74	-1.91

Table 7: Teas sold and prices fetched by distribution channels in second quarter

Different channels	Second Quarter			
	2018		2017	
	Qty (MKg.)	Price (Rs./Kg.)	Qty (MKg.)	Price (Rs./Kg.)
Public Auction	75.84	576.24	76.09	621.46
Private Sales	1.23	648.92	0.78	692.15
Direct Sales	0.47	692.90	0.44	686.61
Total	77.54	578.10	77.31	622.54

The April-June cumulative average for 2018 totaled Rs. 578.10 against Rs. 622.54 in April-June 2017, showing a drop of Rs. 44.44. Total sold quantity has shown a marginal growth in 2018 compared to the corresponding period of 2017.

Table 8 –Grade wise quantity sold and price comparison during the second quarter 2018

Grades	Sold Qty (Kgs)	Avg. Price
ORTH-FBOPF1/FBOPF	8,057,365.50	646.46
ORTH-FOP/OP1/OP	6,953,122.00	626.57
ORTH-BOPF	6,811,380.00	535.54
ORTH-OPA	6,306,209.00	553.63
ORTH-FBOP1/FBOP	5,444,067.50	666.72
ORTH-BP/BM	5,210,730.00	426.31
ORTH-FP/PEK	5,164,295.00	682.04
ORTH-PEK1	4,471,760.00	787.85
ORTH-DUST1	3,904,419.00	504.87
ORTH-BOP	3,580,914.00	599.20
ORTH-BOP1A	3,575,861.50	432.57
CTC-PF1	2,961,336.00	540.64
ORTH-BOP1	2,072,190.00	704.86
ORTH-BOPA	2,010,011.00	522.76
CTC-PD	1,290,398.00	488.84
CTC-BP1/BPS	852,593.00	460.42
OTHERS	8,868,635.00	498.70
Total	77,535,286.50	578.10

Above Table shows that, the highest quantity of 8.06MKgs had been offered at Colombo Tea Auction by Orthodox FBOPF1/FBOPF grade teas with price level of Rs. 646.46/Kg during the second quarter of 2018. Tippy teas continued to attract good demand.



Tea Exports

Table 9 - Export Statistics for each month during second quarter 2018/2017 -Units : Mkgs

Category	2018		2017		Change	
	Qty	FOB	Qty	FOB	Qty	FOB
April	20.88	819.82	20.12	822.83	0.76	-3.01
May	23.08	829.26	24.31	824.43	-1.23	4.83
June	24.74	833.21	25.85	819.35	-1.10	13.86
Total	68.70	827.81	70.28	822.10	-1.58	5.71

Exports of Ceylon Tea for the second quarter registered moderate decrease due to Iran and UAE figures coming down. Fresh U.S. sanctions on Iran Trade affect UAE transshipment operations as well. Table 10. shown below reveals that exports are coming down compared to last consecutive years .

Table 10 - Tea Export Statistics comparison during second quarter 2015-2018 -Units : Mkgs

Month	2018	2017	2016	2015	Growth (Qty) 2018/2017	Growth %
April	20.88	20.12	22.18	22.92	0.76	3.77
May	23.08	24.31	21.26	27.62	-1.23	-5.07
June	24.74	25.85	28.57	27.79	-1.10	-4.27
Total	68.70	70.28	72.01	78.33	-1.58	-2.25

Tea is one of the \$93 billion economy's main foreign currency earners from agriculture sector, along with remittances, garment exports and tourism. Earnings from tea exports rose 3.2 percent in the first six months of 2018. As depicted in Table 11, quantity exported during the first six months of 2018 dropped marginally, but unit FOB price and revenue to the country from tea has increased.

Table 11 – Tea Exports comparison during First Half 2018 /2017Units: Qty-MT, FOB—Rs/Kg, Value— Rs. Mill

Category	2018			2017			Change			% Change	
	Qty	FOB	Value	Qty	FOB	Value	Qty	FOB	Value	Qty	FOB
Bulk	78,898	738.67	58,280	79,047	714.19	56,455	-150	24.49	1,825	-0.19	3.43
Packets	42,482	813.68	34,567	43,685	777.53	33,967	-1,203	36.15	600	-2.75	4.65
Tea Bags	8,666	1,415.69	12,269	9,080	1,350.49	12,263	-414	65.20	6	-4.56	4.83
Instant Tea	1,300	1,293.45	1,681	1,016	1,197.25	1,216	284	96.20	465	27.97	8.04
Green Tea	1,137	1,596.30	1,815	1,073	1,534.89	1,647	64	61.41	168	5.98	4.00
Sub Total	132,483	819.82	108,612	133,902	788.24	105,547	-1,419	31.58	3,065	-1.06	4.01
Re-Exports	5,103	1,043.94	5,328	4,787	1,022.78	4,896	317	21.16	432	6.62	2.07
Total	137,587	828.13	113,940	138,688	796.34	110,443	-1,102	31.79	3,497	-0.79	3.99

Tea exports showed further decline from second quarter, but oil prices have improvement and may boost purchases due to the oil economies being major buyers of Ceylon Tea.

Table 12 -Top Ten destinations of Ceylon tea during Jan– June 2018/2017 Units: Qty - MKg

Country	2018	2017	Change		Total Exports %	
			Qty	%	2018	2017
Iraq	18.27	15.65	2.62	16.73	13.8	11.7
Turkey	17.17	17.06	0.12	0.68	13.0	12.7
Russia	16.35	16.37	-0.03	-0.16	12.3	12.2
Iran	10.95	12.56	-1.61	12.83	8.3	9.4
UAE	5.59	7.74	-2.15	27.79	4.2	5.8
Syria	5.23	3.42	1.81	52.97	4.0	2.6
Azerbaijan	5.16	5.85	-0.69	11.73	3.9	4.4
China	4.91	3.81	1.11	29.05	3.7	2.8
Libya	4.41	6.26	-1.86	29.66	3.3	4.7
Japan	3.37	3.98	-0.61	15.29	2.5	3.0
Total Exports	91.42	92.71	-1.29	-1.39	69.0	69.2

• except re-export volume

Iraq maintained the leading position of main destinations of Ceylon tea and the volume imported during first half increased from 15.65 to 18.27 million kilograms in comparison to same period of 2017. Similarly Turkey which is the second largest importer of Ceylon tea purchased 17.17MKGs as against 17.06MKGs during the first six months reflecting a marginal gain of 0.68%. Russia was able to retain the third place during the first half of 2018 by importing 16.35MKGs decrease of 0.16% in volume terms as against last year. Syria increased her imports from Sri Lanka to 5.23MKGs (52.97%) as against previous year. Although Sri Lanka boasts of a large list of tea export

destinations, the first ten importers in the list accounted for 69% of total exports from January to June in 2018.

Trade Fair Participation

World Tea Expo - 2018 Las Vegas - 13th to 15th June

Sri Lanka Tea Board participated at World Tea Expo - 2018 with two private sector tea exporting companies organizing a Ceylon Tea pavilion nearby the entrance.

1. Damro Tea Exports (pvt) Ltd.



2. Shan Teas (Pvt) Ltd.
3. Suncrest Tea (Pvt) Ltd (Agent)

Seoul Food 2018, South Korea – 1st to 4th May

Sri Lanka Tea Board with the collaboration of Sri Lanka



Embassy in South Korea arranged Ceylon Tea pavilion with three private sector tea export companies.

1. Akbar Brothers (Pvt) Ltd
2. Basilur Tea exports (Pvt) Ltd
3. Imperial Teas (Pvt) Ltd

FHA Singapore 2018 during 24th -27th April 2018

Sri Lanka Tea Board participated at FHA Singapore 2018 with two private sector tea exporting companies.

1. Nature Ceylon Trading (Pvt.) Ltd.
2. Green House Tea Exports Ceylon (Pvt.) Ltd.



SIAL China, Shanghai - 16th -18th May 2018



Sri Lanka Tea Board with the collaboration of Sri Lanka Embassy in Singapore arranged Ceylon Tea pavilion hosting seven private sector tea export companies. Hon. Plantation Minister Navin Disanayake attended the special event organized by organizers.

1. Nature Ceylon Trading (Pvt) Ltd.,
2. Green House Tea Exports Ceylon (Pvt) Ltd.,
3. Maltras International (Pvt)Ltd.,
4. Basilur Tea Exports (Pvt)Ltd.,
5. Regency Teas (Pvt)Ltd.,
6. Enrich Tea & Food Exports (Pvt) Ltd.
7. Euro Asia Corporation (Pvt) Ltd.

Food West Africa 2018 , Lagos, Nigeria from 8th to 10th May 2018 .

Sri Lanka Tea Board participated at the Food West Africa 2018 Trade Exhibition at Land Mark Centre, Lagos, Nigeria from 8th to 10th May 2018. Ceylon Tea pavilion comprised following companies



1. Mabroc Teas (Pvt) Limited
2. Ceylon Fresh Teas (Pvt) Limited
3. Maltras International (Pvt) Limited
4. Millennium Teas (Pvt) limited

World food Warsaw 2018, in Poland from 10th to 12th April 2018.



Sri Lanka Tea Board has arranged a group stand at World food Warsaw which comprised with two private sector exporters,

1. Ceylon Fresh Teas (Pvt) Ltd,
2. Basilur Tea Export (Pvt) Ltd.

Global Tea Scene

Tea Production

The estimated global black tea production in major tea producing countries had improved, though India decreased

their production by 20 Million Kilograms. Production deficit in India was compensated mainly by East African countries .

Table 12 –Major tea producing countries production comparison in first half 2018/2017(MT.)

Production	Months from 1st Jan	2018	2017	Growth (Kg)
NE INDIA	6	327,120	335,150	-8,030
SOUTH INDIA	6	105,340	118,080	-12,740
BANGLADESH	6	19,398	20,225	-827
SRI LANKA	6	158,205	156,464	1,741
KENYA	6	230,995	200,913	30,082
MALAWI	6	34,145	31,544	2,601
TANZANIA	6	20,437	18,268	2,169
TOTAL		895,640	880,644	14,996

The consolidated global average prices depicted in table-13 was below the 2018 level. Table 13 further revealed that Colombo auction prices follow same decrease pattern compared to the world unit price and other auctions .

Table 13- Average prices in major auction centers as at June 2018/2017(Qty:MT)

Centers	2018		2017		2018/ 2017	
	Qty (MI)	US\$/Kg	Qty (MI)	US\$/Kg	Qty (MI)	US\$/Kg
Kolkata	53,878	2.35	63,865	2.19	(9,987)	0.16
Cochin	25,172	1.86	23,644	1.89	1,528	(0.03)
Chittagong	24,529	2.55	27,204	1.96	(2,675)	0.59
Mombasa	234,474	2.61	194,460	2.80	40,014	(0.19)
Jakarta	-	-	-	-	-	-
Colombo	151,075	3.88	151,995	4.07	(920)	(0.19)
Guwahati	55,585	2.05	58,664	1.93	(3,079)	0.12
Malawi	6,224	1.85	6,012	1.78	212	0.07
World	550,987	2.83	525,844	2.90	25,083	(0.07)

Tea Board of Kenya shows the country exported 241.6 Mlks accounting major share of the world tea exports. Again ,Kenya has overtaken Sri Lanka and China to become the number one tea exporter in the world. Tanzania and Malawi exports gained increase following their lower prices in domestically.

Table 14 - Global Tea Exports Comparison (2018-2017) Unit: MT

Country	Period of months	2018	2017	Growth	Change %
Kenya	6	241,601	221,155	20,446	9.25
China	3	84,858	85,942	-1,084	-1.26
Sri Lanka	6	132,483	133,902	-1,419	-1.06
Taiwan	6	3,931	4,494	-563	-12.53
Bangladesh	6	241	2,028	-1,787	-88.12
Tanzania	6	16,531	14,971	1,560	10.42
Malawi	6	21,354	19,454	1,900	9.77
Uganda	3	8,407	10,282	-1,875	-18.24

Lifting of glyphosate ban for tea plantations CTTA hopeful of revival of tea industry

The Colombo Tea Traders' Association (CTTA) is hopeful that the tea industry woes will end with the government's decision last week to lift the ban on import of glyphosate for the tea and rubber industries.

Releasing a statement on Friday, the Association said, "We are indeed happy that this disaster which was inflicted on the tea industry that created financial, commercial and reputational losses has come to an end."

The statement in full:

"Following positive discussions between the President and the Chairmen of the Sri Lanka Tea Board and the Colombo Tea Traders' Association, facilitated through the good offices of Asanka Dodanwela, Private Secretary to the Minister of Defence and the President's Office, earlier this week, a favourable decision was reached in regard to the lifting of the ban on the herbicide, Glyphosate, exclusively for the use by the Plantation Sector, under strict regulation of the Sri Lanka Tea Board and the Tea Research Institute.

The Colombo Tea Traders' Association, the apex body of the country's tea industry, and all the industry stakeholders are deeply indebted to the President, for his keen perception and sound judgment, and to the Minister of Plantation Industries, for his unrelenting efforts and dynamic endeavours, in achieving a successful resolution to this long-outstanding issue.

The Colombo Tea Traders' Association and the entire Tea Industry convey their sincere gratitude to the President and the Minister of Plantation Industries, for the vital roles they played in rescinding the ban on Glyphosate imposed in 2015, which had created a serious crisis vis-à-vis the Japanese market, with imminent consequences of a total suspension of imports of Ceylon Tea to that country.

Innovation in the World Tea Industry By: Dan Bolton

Introduced last year in the U.K., the product claims it will eliminate the 370,000 metric tons of tea bags sent to landfills. Just spray the "No More Tea Bags" preservative-free concentrate into a mug, add hot water. Enjoy up to 20 cups with no soggy tea bags, no messy leaves. The erstwhile inventor is pictured in his basement filling environment-friendly cans with harmless-to-the-atmosphere gas. Well marketed, there was a bright flash of media attention... followed by a predictable backlash from those who saw the claims as greenwash. This was followed by a coup de grâce delivered by bloggers who hated the taste, waste, mouthfeel, color, odor, conveyance, and metallic aftertaste.

World consumption of tea has doubled to more than 5 billion kilos. Global growth has topped 60 percent in recent years. Consumers today spend more on quality tea. Young and old both embrace the artisan production and nuanced taste of tea while praising its healthful properties.

Yet there are troubling signs the retail segment is in need of innovation.

Consumption of artisan processed loose leaf tea is not accelerating in traditional retail channels – in fact it's flat. The suburban malls where millions first sample fine tea are experiencing significant declines in foot traffic – the lifeblood of brick & mortar retailers.

Chain expansion has stalled in the U.S. and Canada where DAVIDsTEA and Teavana are still experimenting to achieve sales per square foot and same-store sales increases commonly reported by coffee shops (many of which are profiting handsomely from selling tea).

There are conventional remedies to apply:

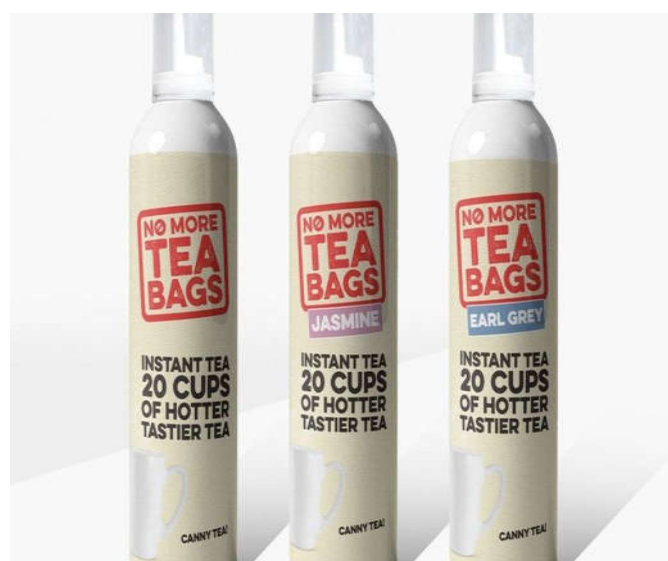
Make tea retail selections more traceable and provide authentic stories on sourcing
Make stores into destinations, not sterile cookie-cutter outlets.
Commit to sampling as studies show that sampling leads to sales.

One thing is certain — tea in spray cans is not the answer.

During the past year I spoke to many inventors and innovators in preparing for this talk. I know that what I say will be of benefit — but first I need to dispel many of your notions about innovation.

I hope to shift your understanding from the glowing lightbulbs of "genius discovery" and "magic thinking" to systematic problem-solving that is more practical and powerful. My advice: Discard any project that does not increase the number of customers drinking tea or increase the amount of tea drinking among existing customers.

The goal is to discover innovations that move the needle by increasing beverage occasions — everything else is a distraction.

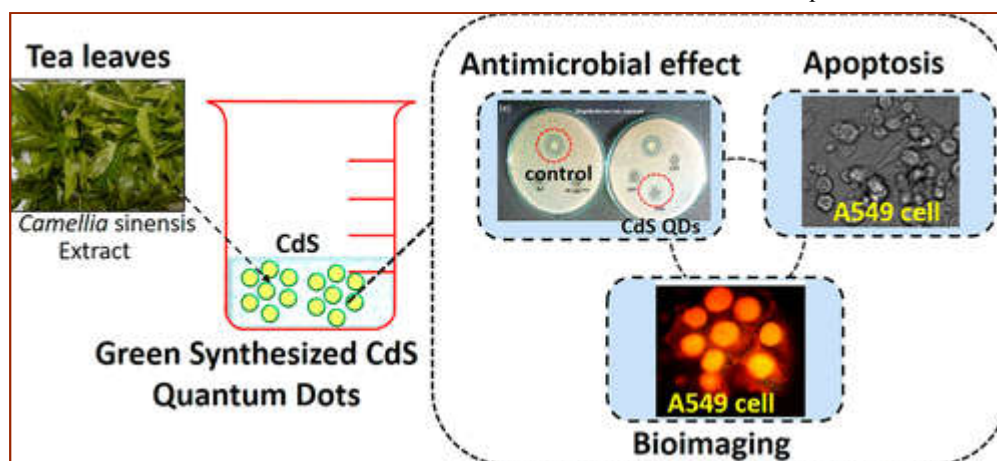


Aerosol tea

Research Update

Nanoparticles derived from tea leaves inhibit the growth of lung cancer cells, destroying up to 80% of them, new research by a joint Swansea University and Indian team has shown.

The team made the discovery while they were testing out a new method of producing a type of nanoparticle called quantum dots. These are tiny particles which measure less than 10 nanometres. A human hair is 40,000 nanometres



thick.

Although nanoparticles are already used in healthcare, quantum dots have only recently attracted researchers' attention. Already they are showing promise for use in different applications, from computers and solar cells to tumour imaging and treating cancer.

Quantum dots can be made chemically, but this is complicated and expensive and has toxic side effects. The Swansea-led research team were therefore exploring a non-toxic plant-based alternative method of producing the dots, using tea leaf extract.

Tea leaves contain a wide variety of compounds, including polyphenols, amino acids, vitamins and antioxidants. The researchers mixed tea leaf extract with cadmium sulphate (CdSO_4) and sodium sulphide (Na_2S) and allowed the solution to incubate, a process which causes quantum dots to form. They then applied the dots to lung cancer cells.

They found:

Tea leaves are a simpler, cheaper and less toxic method of producing quantum dots, compared with using chemicals, confirming the results of other research in the field. Quantum dots produced from tea leaves inhibit the growth of lung cancer cells. They penetrated into the nanopores of the cancer cells and destroyed up to 80% of them. This was a brand new finding, and came as a surprise to the team. The research, published in Applied Nano Materials, is a collaborative venture between Swansea University experts and colleagues from two Indian universities.

Dr Sudhagar Pitchaimuthu of Swansea University, lead researcher on the project, and a Ser Cymru-II Rising Star Fellow, said:

"Our research confirmed previous evidence that tea leaf extract can be a non-toxic alternative to making quantum dots using chemicals.

The real surprise, however, was that the dots actively inhibited the growth of the lung cancer cells. We hadn't been expecting this.

The CdS quantum dots derived from tea leaf extract showed exceptional fluorescence emission in cancer cell bioimaging compared to conventional CdS nanoparticles.

Quantum dots are therefore a very promising avenue to explore for developing new cancer treatments.

They also have other possible applications, for example in anti-microbial paint used in operating theatres, or in sun creams."

Dr Pitchaimuthu outlined the next steps for research



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