

EMERALD



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EMERALD

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**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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11 Emerald

Emerald in Hindi, commonly called as 'Panna', is a variety of mineral beryl and is chemically a complex silicate of aluminium and beryllium ($\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$). The hardness of Emerald is about 7.5-8 on Moh's scale. Emeralds are rare & precious gemstones that command immense value on account of their cut, colour, clarity and carat. Beauty, rarity and durability are the main virtues of a gemstone. The cut stones are known as gems, while the uncut ones are gemstones. Emeralds occur in hues varying from yellow-green to blue-green. However, emeralds with unique velvety green colour with high degree of transparency are considered as most precious among gemstones. The rose variety of beryl is called morganite, and the golden yellow variety is termed 'golden beryl'. If the colour is bluish green or blue then it is called 'aquamarine'. When emerald contains chromium as an impurity, it imparts the colour green. Emerald is generally found at the contact of pegmatites intruding schists, mainly amphibole schists.

RESERVES/RESOURCES

As per NMI data, as on 01.04.2015 based on UNFC system, the total resources of emerald in the country are estimated at 55.87 tonnes. All resources are placed under Reconnaissance category and Unclassified grade resources have been reported in the State of Jharkhand (Table-1).

Occurrences of emerald are also reported from Rajasthan, Odisha and Chhattisgarh. However, resources have not been estimated so far. In Rajasthan, emeralds have been found to occur at a number of places in districts of Rajsamand and Ajmer. In Ajmer-Rajsamand belt of Rajasthan, emerald occurrences are confined to the upper fringes of pegmatites. Emerald deposit is found in the 221 km long belt stretching from Gam Gurha in Rajsamand district to Bubani and Muhami in Ajmer district. Important localities are Rajgarh, Tikhi and Kalaguman (Rajsamand). The occurrences are highly sporadic and variable.

In Odisha, occurrences of emerald are reported from Bira-Mohorajpur belt in district Bolangir. In Chhattisgarh, occurrences of emerald are reported from Deobhog area in Raipur district. Sporadic and

irregular crystals of emerald, aquamarine and amethyst are also reported in a few localities in district, Coimbatore Tamil Nadu.

PRODUCTION

Production of emerald has not been reported since 1983. However, a single lease of 46.32 ha area was granted to M/s Serva Shri Mining & Mineral Industries in district Ajmer, Rajasthan in the year 1998. The mine-head closing stocks of emerald at the end of the years 2019-20 and 2018-19 were 20 kg each (Table-2). The average daily employment was nil in both the years.

Table – 2: Mine-head Stocks of Emerald, 2018-19 & 2019-20 (By States)

(In kg)		
State	2018-19	2019-20 (P)
India/ Rajasthan	20	20

MINING AND MARKETING

Mining of emerald was mostly undertaken manually by opencast method. The pits were worked at shallow depths. The stones collected during mining were sorted out according to size, shape and quality. The stones so collected were deposited with the State Government under the supervision of DMG officials and mine owners. Worldwide, crude emerald was sold through public auction from time to time.

The beauty of rough stone is enhanced by skilful cutting and polishing into faceted or rounded form for use in jewellery. The rough stones are sorted out to determine the angles to which facets can be cut. They may be sawed or polished in any direction according to shape, size and colour to be retained. After the shape and size are determined, the next process of 'pre-shaping' is done. The third and important process called 'calibration' gives the pre-shaped stone a definite proportion and size. The process that follows is 'faceting' and 'polishing'. The aim of this process is to achieve maximum internal reflection enhancing the beauty of the stones. Emeralds are generally given a step-cut or cabochon-cut.

**Table – 1 : Reserves/Resources of Emerald as on 1.4.2015
(By Grade/State)**

	Reserves			Remaining Resources					Total Resources (A+B)	
	Proved STD111	Probable STD121 STD122	Total (A)	Feasibility STD211	Pre-feasibility STD221 STD222	Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334
All India : Total	-	-	-	-	-	-	-	-	55869	55869
By Grade										
Unclassified	-	-	-	-	-	-	-	-	55869	55869
By State										
Jharkhand	-	-	-	-	-	-	-	-	55869	55869

Figures rounded off

India is the leading exporter of cut and polished gem, but continued to depend on raw materials. The Diamond and Gem Development Corporation of India has set up Diamond and Gem Parks for cutting and polishing of gems in different States. Jaipur in Rajasthan is the major centre for processing emeralds. Like diamonds, uncut emerald is imported and part of it is exported after processing. Emerald is next to diamond (uncut) amongst precious and semi-precious stones, being imported and re-exported after cutting and polishing.

Prices are governed by many factors including beauty, clarity, defect, demand, durability and rarity. Prices of precious stones also vary over time.

WORLD REVIEW

World production of emerald is reported mainly from Colombia, Pakistan, Afghanistan, Africa, Nigeria, Mozambique, United States of America, Madagascar, Brazil, Zambia and Zimbabwe.

Afghanistan

Afghanistan's Panjshir Valley has shown potentiality for commercial emerald production. Emeralds have been found only on the eastern side of the valley, even though the western side has been searched extensively. The emerald mines of Afghanistan are located approximately 70 miles (113 km) north east of Kabul and extend from the village of Khenj to Dest-e-Rewat. The emerald mines are located at elevations between approximately 7,000 and 14,300 ft. (2,135 and 4,270 m) in mountainous terrain on the eastern side of River Panjshir. The Panjshir emerald crystals vary in quality from mine to mine. In general, Panjshir emeralds are mined and marketed in a free-enterprise system.

Madagascar

Madagascar was a globally significant producer of gemstone that included emerald, ruby and sapphire. Emerald was produced from the Kianjavato emerald mines which are located in the rain-forest region of eastern Madagascar, approximately 60 km west of the coastal city of Mananjary. Emeralds are also mined at the Ianapera (Sakalava) emerald deposits in the Ianapera (Janapera) area of Tuléar (Toliara) Province, 350 km east of the town Toliara. Societe Orgaco of France mined the emerald (536 kg Heaven's gift) in matrix at the Morafeno mine near Mananjary and exported it to Reunion.

Pakistan

In Pakistan, the Fizzagat emerald mine is situated near the district headquarters of Mingora in Swat valley.

Brazil

Since the 1970's, Brazil has been consistent source of emerald. Brazilian emerald deposits are found in a typical geological setting with Archean basement and supracrustal, ultramafic and granitoid rocks. Brazil emerald mines are located in the states of Bahia, Minas Gerais and Goias. Brazil's emerald production goes to both domestic cutting and foreign buyers who take the rough back to cutting centres in their own country.

Colombia

In Colombia, the mining activity of emerald has been concentrated in the departments of Cundinamarca and Boyaca, in the denominated East and West emerald belts. Mining districts of Chivor, Gachala and Macanal (Eastern Belt) and Muzo, Coscuez, Penas Blancas, La Palma-Yacoi and La Pita (Western Belt) are located in Colombia. The most representative mines are Muzo, Cunas, Coscuez, La Pita and Chivor.

Zambia

Zambia is one of the world's most significant sources of fine-quality emerald and has been called the second most important producer by value after Colombia. The emerald mines are located in the Kafubu area of central Zambia, about 45 km southwest of the town of Kitwe. The majority of the gems produced in Zambia are found in the Kamakanga and Kagem mines. Both are located in the north-eastern region of the country. Gemfields, the world's biggest emerald miner has found a gem that weighs more than 1.1 kg at its mine in Lufwanyama. Earlier 5,655 carat stone was found at the Kagem Mines.

Others

Zimbabwe produces rough emeralds from the Sandawana mine, located in the southwest of the country. In the United States of America, in Beaver County, Utah rare red emeralds are found in the eastern slopes of the Wah Wah Mountains. In Ethiopia, a new deposit of high-quality emeralds has been found in the rural areas of Kenticha and Dermi, in the district Seba Boru. Mining still is done through hand tools, without heavy machinery.

FOREIGN TRADE

MMTC is an authorised agency of the Government of India for import of precious & semi-precious stones including emerald and supply these items to jewellers for domestic sales and exports.

Exports

In 2019-20 exports value of emerald (cut & uncut) decreased substantially by 24% to ₹ 1,738.79 crore from ₹ 2,302.62 crore in the previous year. Exports were mainly to Hong Kong (53%), USA (21%), Thailand (9%), Switzerland & Italy (3% each), Belgium & UK (2% each) and France, UAE & Japan (1% each). Out of the total export value of emerald (cut & uncut), the share of the export value of emerald (cut) was about almost cent per cent. The export value of emerald (cut) decreased considerably by 23% to ₹ 1,732.78 crore in 2019-20 from ₹ 2,253.06 crore in the preceding year. In terms of quantity, the export of emerald (cut) decreased substantially by 31% to 21,960 thousand carat in 2019-20 from 31,790 thousand carat in the preceding year. Exports were mainly to USA (38%), Hong Kong (23%), Thailand (13%), UK (9%), Japan (5%), Italy (4%) and UAE (1%). On the other hand, the share of the export value of emerald (uncut) was negligible. The export value of emerald (uncut) decreased drastically by 88% to ₹6 crore in 2019-20 from ₹49.57 crore in the preceding year, while, in terms of quantity, the export of emerald (uncut) increased drastically by more than eleven fold to 34 tonnes in 2019-20 from 3 tonnes in preceding year. Exports were mainly to China (71%), USA (15%) and Germany & Hong Kong (6% each) (Tables- 3 to 5).

Imports

In 2019-20, the total imports value of emerald (cut and uncut) decreased drastically by 33% to ₹2,440.35 crore from ₹3,659.23 crore in the preceding year. Imports were mainly from Hong Kong (35%), Zambia (31%), Thailand (11%), USA (8%), Switzerland (3%), Brazil (2%) and Singapore, UAE, South Africa & France (1% each). In the total import value of emerald (cut & uncut), the share of imports value of emerald (cut) was (43%), while the share of imports value of emerald (uncut) was

57%. The imports value of emerald (cut) decreased substantially by 52% to ₹1,053.16 crore in 2019-20 as compared to ₹2,175.89 crore in the preceding year. In terms of quantity, the imports of emerald (cut) increased substantially by 77 % to 90,368 thousand carat in 2019-20 from 51,012 thousand carat in the preceding year. In terms of quantity, imports were mainly from Thailand (78%), Hong Kong (4%), USA (3%) and Zambia & Sri Lanka (1% each). However, the import value of emerald (uncut) decreased marginally by 6% to ₹1,387.19 crore in 2019-20 as compared to ₹1,483.34 crore in the preceding year. In terms of quantity, the imports of emerald (uncut) also increased substantially by 200% to 138 tonnes in 2019-20 from 46 tonnes in the preceding year. In terms of quantity, imports were mainly from Zambia (33%), China (18%), Brazil (8%), Hong Kong (4%) and Thailand (1%) (Tables-6 to 8).

**Table – 3: Exports Value of Emerald
(Cut & Uncut): Total
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty **	Value (₹'000)	Qty **	Value (₹'000)
All Countries	**	23026249	**	17387874
Hong Kong	**	11633445	**	9190549
USA	**	5441398	**	3679049
Thailand	**	1537578	**	1584651
Switzerland	**	1138119	**	481511
Italy	**	414979	**	468393
Belgium	**	666069	**	404137
UK	**	593000	**	275892
France	**	400696	**	197372
UAE	**	201579	**	180594
Japan	**	234427	**	179712
Other countries	**	764959	**	746013

Figures rounded off

Note: Quantity not given due to partial coverage; value figures, however, have full coverage.

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**Table – 4: Exports of Emerald (Cut)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (^{'000} 'carat)	Value (₹'000)	Qty (^{'000} 'carat)	Value (₹'000)
All Countries	31790	22530565	21960	17327834
Hong Kong	8825	11551661	4943	9162031
USA	14248	5435730	8454	3674691
Thailand	2751	1535260	2947	1574841
Switzerland	366	1138119	77	481511
Italy	851	414979	833	468387
Belgium	46	666040	17	393742
UK	909	277457	1990	275607
France	30	400654	17	197371
Japan	1090	234311	1056	179462
UAE	345	197841	118	179021
Other countries	2330	678514	1508	741170

Figures rounded off

**Table – 6: Imports of Emerald (Cut & Uncut) : Total
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty **	Value (₹'000)	Qty **	Value (₹'000)
All Countries	**	36592286	**	24403507
Hong Kong	**	13486307	**	8595961
Zambia	**	4747143	**	7514560
Thailand	**	2102837	**	2606036
USA	**	2107550	**	1921789
Switzerland	**	1202097	**	788977
Brazil	**	434381	**	480562
Singapore	**	552473	**	359564
UAE	**	4322254	**	254307
South Africa	**	64249	**	188790
France	**	256713	**	123966
Other countries	**	7316283	**	1568995

Figures rounded off

Note: Quantity not given due to partial coverage; value figures, however, have full coverage.

**Table – 5: Exports of Emerald (Uncut)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3	495684	34	60041
Hong Kong	2	81785	2	28518
Belgium	++	29	++	10395
Thailand	++	2319	++	9810
USA	++	5668	5	4358
Israel	++	40600	++	2648
UAE	++	3738	++	1573
Germany	++	462	2	1093
China	-	-	24	321
UK	++	315543	++	285
Japan	++	116	++	250
Other countries	++	45426	1	790

Figures rounded off

**Table – 7: Imports of Emerald (Cut)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (^{'000} 'carat)	Value (₹'000)	Qty (^{'000} 'carat)	Value (₹'000)
All Countries	51012	21758892	90368	10531607
Hong Kong	11857	9355497	3172	4757745
Thailand	24137	2032510	70914	2053978
USA	1442	1643634	2425	1234090
Switzerland	442	1202097	54	788977
Zambia	342	278009	1174	165859
France	6	256713	1	123966
Italy	71	162258	21	94446
Sri Lanka	834	105308	625	70233
Bahrain	148	47501	126	41380
UK	63	93361	2	38189
Other countries	11671	6582004	11854	1162745

Figures rounded off

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**Table – 8: Imports of Emerald (Uncut)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	46	14833394	138	13871900
Zambia	17	4469134	46	7348701
Hong Kong	10	4130810	6	3838216
USA	++	463916	++	687698
Thailand	++	70327	1	552059
Brazil	16	434381	11	465145
Singapore	++	519768	++	327882
UAE	1	4189123	++	227258
South Africa	++	39	++	172282
China	++	89585	25	82072
Colombia	++	7206	++	81118
Other countries	1	459105	48	89469

Figures rounded off

FUTURE OUTLOOK

Gems and Jewellery Export Sector has been contributing about 13%-15% to India's total merchandise exports during the last five years. As per industry estimates, this sector employs more than 4.64 million employees. With a view to strengthen the Gems & Jewellery Industry in the country, the Government has taken a number of steps, such as, establishment of Special Notified Zone (SNZ); announcement of separate ITC HS

Code for lab-grown diamonds; introduction of Gold Monetisation Scheme; amendment of wastage and value addition norms for gems and jewellery items; approved scheme for setting up of Common Facility Centres for Gem and Jewellery Sector; and providing financial assistance for participation in international fairs, organising buyer-seller meets etc. under Market Development Assistance (MDA) and Market Access Initiative (MAI) Schemes of the Department of Commerce.