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Oil Crops and Oil Production Trends

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Edible oils are main constituent of human diet. Production figures of oils crops and oils provide information not about only production patterns but consumption patterns too. Knowing this information helps industry as well educators in focusing on important oil crops and oils. It was found in this study that world is dominated only by few oil crops and oils. Further it was discovered that only handful of countries contribute to bulk of oil crops and oils.

Keywords: Oil crops; edible oils; production; scenario; trends.

1. INTRODUCTION

This paper is about drawing conclusions from oil crop and oil production trends from 2014 to 2020 time period. Production figures of oils crops and oils provide information not about only production patterns but consumption patterns too because whatever is produced is consumed too. Discussion presented in this paper is useful not only to industry but also to educators in focusing resources on important oil crops and oils. Similar studies are already reported in literature [1–4].

2. METHODOLOGY

The data presented in this paper was obtained from FAO website [5]. It was then processed using spread sheet application to draw relevant

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conclusions. Only most recent six years was taken into consideration, for with data was available, assuming that six years is window long enough to provide meaningful insights in trends. It must be noted that agricultural output can vary with seasonal effects i.e. one year may be draught year and another may be flush year. Thus just comparing any two years is not enough. For that reason when growth rate is calculated it is based on comparing first three year average and last three year average out of six recent year data taken in study. All figures are in thousand metric tons.

3. RESULTS AND DISCUSSION

The sources of edible fats and oils can be divided in two: vegetable oils like palm oil, soybean oil, canola oil, sunflower oil etc. and animal oils/fats like lard form pigs, tallow from cows and buffaloes or sheep, butter form milk and marine oils form marine animals [5]. As far production quantities are concerned word vegetable oil production far outstrips vegetable oil production as per FAO [5]. Thus vegetable oils are dominant oils and not animal fats.

3.1 World Vegetable Oil Crop Production

You can see from the table that oil palm and soybean are top crops as far as production figures are concerned. Oil palm represents 37% while soybean represents 31% of total oil crops produced as of 2020. Collectively these two crops represent 68% of oil crops completely dominating oil crop scenario. Next three crops hover around 6% contribution each making only 18% contribution to total oil crops. In total top five crops control 87% production. Finally there is long tail of insignificants, as usual [6], for remaining 13% share. The reason for such domination is elimination of other crops in favor of few due to economic reasons. For example palm oil has highest oil productivity per unit area of land compared to other oils [7] while soybean crop not only provide oil but valuable proteins making it economically more competitive [8].

Table 1. Word vegetable oil production in thousand metric tons

Oil crop	2015	2016	2017	2018	2019	2020
Oil palm fruit	340702	338673	411530	414083	420681	423171
Soybeans	324867	337648	361230	346484	338135	355262
Seed cotton	67443	68896	75236	73478	85311	83387
Rapeseed	71693	69622	78027	76531	73279	73825
Coconuts	63738	62984	62046	68510	67104	66502
Groundnuts, with shell	47121	48281	50755	53523	51806	55909
Sunflower seed	43446	48691	49765	53186	57273	51470
Olives	21980	21146	22255	25965	23060	22095
Sesame seed	6098	6144	6293	6496	7095	7353
Linseed	3692	3464	3431	4676	5301	4832
Oilseeds nes	2964	3071	3087	2932	2885	2918
Castor oil seed	2249	1843	1846	2053	1702	2335
Melonseed	1136	1123	1164	1209	1159	1146
Tallowtree seed	1020	1025	1044	1049	1056	1063
Safflower seed	1011	1138	924	784	762	819
Karite nuts	659	820	717	833	935	877
Mustard seed	744	900	769	757	763	648
Tung nuts	684	638	599	588	602	621
Kapok fruit	317	340	331	328	328	328
Poppy seed	281	269	240	123	123	117
Hempseed	42	42	46	36	36	41
Jojoba seed	5	5	5	5	5	5
Grand Total	1001891	1016760	1131341	1133630	1139401	1154727

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3.2 Growth in Production of Oil Crops

Here growth rate in top oils crops is presented based on production figures are shown in Table 1. Collectively Table 2 oil crops contribute 96% of production and thus in next five years we can expect them to remain dominant. Oil pam has highest growth rate among all oils while soybean has lowest. Thus it is expected the in next five years palm oil will gain more dominance, while importance of soybean oil will decline relatively. Cotton seed and sunflower seed production is also on rise at relatively faster rate. Reason for growth in oil crops is mainly increase land area under crop and not due to something like green revolution [9]. Changing crop patters also contribute to rise and decline of oil crops i.e. cotton seed oil was once major oil of USA [10] but it fell to soybean oil due to better returns [11]. One more reason for palm oil growth reason is productivity of oil palm per unit land area which gives it competitive advantage over other oils [7,12].

3.3 Contrariwise Production for Top Oil Crops

3.3.1 Palm crop

It can be clearly seen there that oil palm crop production is dominated by just two nations i.e. Indonesia and Malaysia. In last six years, Indonesia is becoming more dominant compared over Malaysia. Actually it was Malaysia where oil palm revolution started [13] and it was historically leading country in production of oil palm fruits. But then neighbor Indonesia saw it and rivalry set in. Indonesian government started juggernaut efforts to topple Malaysia from crown position. Due large land area compared to Malaysia it was destiny of Indonesia to wear crown of top palm production and as time passed it happened really [14]. But who knows what is hidden in future, tomorrow crown may rest on Brazil or other equatorial large nation. Possibly palm trees are not only equator loving but sea loving too [4] and due to such nature of palm crop, Indonesia and Malaysia will dominate palm oil landscape for foreseeable future as they have long sea shore due to their island like nature.

Table 2. Percent growth in top oil crop production

Oil crop	% Growth/Year
Oil palm fruit	5.1
Soybeans	0.5
Seed cotton	4.8
Rapeseed	0.7
Coconuts	2.4
Groundnuts, with shell	3.4
Sunflower seed	4.7
Average of all crops	2.9

Table 3. Percentage share of top palm crop producer countries

Country	2015	2016	2017	2018	2019	2020
Indonesia	53.9	57.1	59.0	59.5	59.5	60.7
Malaysia	28.9	25.5	24.8	23.8	23.6	23.0
Thailand	3.3	3.4	3.6	3.8	3.9	3.7
Nigeria	2.4	2.5	2.2	2.3	2.4	2.2
Colombia	1.9	1.7	2.0	2.0	2.0	1.7
Total	90	90	92	91	91	91

Fig. 1. Malaysia and Indonesia from left to right are top palm oil producer countries

3.3.2 Soybean oil crop

For soybean oil crop production USA was number one country until recently but now top position is taken by Brazil due to decrease in USA output as Brazilian output is almost unchanged. The change is result of change in relative cropping pattern in USA i.e. less cropping area under soybean as this happened with cotton seed oil [11]. Soybean crop production shows declining trend in Argentina. China has small share in production but it has shown good growth. India is holding almost constant production. In short whatever growth we see in world soybean oil is mainly contributed by China.

3.4 World Vegetable Oil Production

It was amply stated in in oil crop production scenario that who is topping charts and who is posed to grain ground. Palm oil and palm kernel oil control 37% and 4% oil production share as per year 2019 figures. Collectively they make 41% of world edible oil production and thus palm and palm kernel oil dominate oil industry. Soybean oil comes distant second with 30% production share. Third potion is held by rapeseed oil at 10%. This looks anomaly if you see oil crop production figures as it is cotton seed which is at third position there. The possible explanation is presence of gossypol toxin in cotton seeds [15] which render them unsuitable for human consumption and requires costlier refining while other oils can be used just after filtering along with change in cropping patterns makes cotton seed oil less competitive pricewise in market [11]. Thus cotton seeds are used for other purposes though these alternative uses bring low price because as soon as we try to use them on large scale prices become uncompetitive. Same is the case of coconuts and groundnuts. Coconuts have may alternative uses and their oil is popular only in some regions [16]. Sunflower oil contributes only 10% in world total oil production as per 2019 figures. Groundnuts are also consumed as such, used in peanut butter and myriad of other uses and peanut oil is popular only in regions where it is native crop [17] thus ground nut oil is not in top five oils though it is sixth major oil crop. Just top file oils contribute to 90% of total world oil production!

Table 4. Percentage share of top soybean crop producer countries

Country	2015	2016	2017	2018	2019	2020
USA	32.9	34.5	29.2	29.1	23.0	26.6
Brazil	28.6	28.5	27.9	28.5	27.2	28.8
Argentina	18.0	17.4	13.4	9.1	13.1	11.5
China, mainland	3.5	3.8	3.7	3.9	4.3	4.6
India	2.5	3.9	3.2	2.6	3.2	2.7
Total	86	88	77	73	71	74

Table 5. Word vegetable oil production in thousand metric tons

Oil	2014	2015	2016	2017	2018	2019
Palm	57626	60299	58620	68973	71735	74583
Soybean	46283	50304	52266	56556	57232	59873
Rapeseed	26307	26163	24493	24296	24666	19795
Sunflower	16150	15293	16053	18179	18405	20040
Palm kernel	6564	6838	6378	7305	7918	8226
Groundnut	4785	4758	5018	4532	4455	4153
Cottonseed	5019	4526	4270	4346	4456	4447
Coconut	3099	3082	3194	3174	3309	3160
Olive, virgin	2254	3403	3431	3141	3672	3093
Maize	2534	2756	2966	3242	3400	3529
Sesame	923	1004	1065	1053	1010	998
Linseed	632	683	757	768	736	683
Safflower	108	118	117	90	95	72
Grand Total	172283	179227	178628	195656	201088	202652

3.5 Growth in Production for Top Oils

Seeing growth trend we can say that world will use more palm oil in coming decade compared to other oils and possibly it is poised to dominate oil industry more and more. If we combine palm oil and palm kernel oil growth it still gives us 7.2% growth and is not matched by any other oil crop. Tough soybean crop production does increase at around 0.5% in last six years; soybean oil is growing at 5.6% which indicates that more and more soybean is diverted to oil extraction process. Compared to soybean oil, palm oil growth is contributed by increase production due to increase cropping area [7], [12], and if this trend continues, possibly palm oil dominance will increase because there is limit on how much soybean can be diverted to oil processing keeping total production of soybean constant. Apart from palm oil, palm kernel oil and soybean oil, only oil which is growing is sunflower oil due to increased cropping and possibly more diversion toward oil extraction. Other major oils show downward trajectory i.e. rapeseed oil production contracted 3.6%, ground nut oil production declined 3.3% and cotton seed oil has seen negative growth of 1.4%. This indicates that relative importance of these oils is in decline. The reasons for such negative growth can be competitive price, charging crop pattern and consumer preferences [11].

3.6 Contrariwise Production of Top Oils

3.6.1 Palm oil

As with palm crop, palm oil industry is dominated just by two countries. As only use of palm crop is for oil extraction we see no anomaly like soybean oil where oil production is increasing but not crop production. Indonesia and Malaysia export row palm oil which is refined in other countries but recently the countries are focusing on refining at home to squeeze out more profits [18].

Table 6. Growth in oil crop production

Oil	% Growth per year
Palm	7.3
Soybean	5.6
Rapeseed	-3.6
Sunflower	6.4
Palm kernel	6.2
Groundnut	-3.3
Cottonseed	-1.4
Industry Average	4.4

Table 7. Percentage share of top palm oil producer countries

Country	2014	2015	2016	2017	2018	2019
Indonesia	50.8	51.5	54.1	55.0	56.6	57.5
Malaysia	34.1	33.1	29.5	28.9	27.2	26.6
Thailand	3.5	3.4	3.1	3.8	3.9	4.1
Colombia	1.9	2.1	2.0	2.4	2.3	2.0
Nigeria	1.6	1.6	1.6	1.5	1.6	1.6
Total	92	92	90	92	91	92

Table 8. Percentage share of top soybean oil producer countries

Country	2014	2015	2016	2017	2018	2019
China, mainland	25.3	26.9	27.0	28.0	28.2	25.9
United States of America	21.0	19.6	19.2	18.4	19.0	18.9
Brazil	16.1	16.1	15.1	17.9	16.4	18.8
Argentina	15.3	15.7	16.6	14.3	12.7	13.5
India	3.6	1.9	2.0	2.5	2.6	2.4
Total	81	80	80	81	79	80

3.6.2 Soybean oil

USA is top soybean crop producer followed closely after Brazil both having roughly 28% share in total crop production but as of 2020 situation is different when it comes to soybean oils. China tops charts (approximately 25% contribution compared to 18% of each USA and Brazil) when it comes to soybean oil production. The reason can be ascribed to raw soybean export by USA and Brazil to China [19]. Soybean oil production share of Argentina and India correlate well with their share in soybean crop production suggesting local processing.

4. CONCLUSIONS

Word oil crop and oil production landscape is dominated by just few entities and palm oil, palm kernel and soybean oils are contributing to 70% of world edible oil production, that is to say just two crops provide world's most of edible oil. If we look at growth it appears that dominance of palm oil will only increase in near future and Indonesia and Malaysia will remain main providers of palm oil. In long run only soybean oil have potential market share to challenge palm oil dominance but soybean crop production appears stagnant and just more soybeans are appears to be diverted to oil production channel. Form other top oils rapeseed, groundnut and cotton seed oils are in decline while sunflower oils shows healthy growth.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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