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Research Article

PREDICTION AND ANALYSIS OF DAUCUS CAROTA YIELDS IN FIVE DISTRICTS AT KARNATAKA STATE

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ABSTRACT

Statistics plays a vital role in prediction and analysis of the statistical data. Nowadays people are suffering a lot with different types of health problems especially Cholesterol, Cancer, BP, Diabetic etc for better health by eating vegetables then we can control our health problems. So using of carrot vegetables people are getting good health from cancer, cholesterol, BP such problems. We are interested in forecasting carrot vegetable yields in various districts in Karnataka state.

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INTRODUCTION

Molecular and genetic studies, along with written history, support the idea that the cultivated / domesticated carrot has a single origin in central Asia. The wild ancestors of the carrot are likely to have originated in Persia (regions of which are now Iran and Afghanistan) which remains the center of diversity for Daucus carota, the wild carrot. A naturally occurring sub species of the wild carrot was presumably bred selectively over the centuries to reduce bitterness, increase sweetness and minimize the woody core; this process produced by the familiar garden vegetable.

Carrot was found in Switzerland and Southern Germany dating back to 2000-3000 BC. The first mention of the root in classical sources is during the first century, and the carrot may have been eaten as a root vegetable by the Romans.

Varieties

The carrot is root vegetable, usually orange in color, though purple, black, red, white, and yellow cultivars exist. Carrot is a domesticated form of the wild carrot (Daucus carota) native to Europe and southwestern Asia. The plant probably originated in Persia and originally cultivated for its leaves and seeds. The most commonly eaten part of the plant is the taproot, although the greens are sometimes eaten as well. The domestic has been selectively bred for it is greatly enlarged more palatable less woody-textured taproot.

Morphology

The carrot is a biennial plant in the umbel lifer family Apiaceous. At first, if grows a rosette of leaves while building up the enlarge taproot. Fast-growing cultivars nature within three months (90 days) of sowing the seeds, while slower-maturing cultivars are harvested four months later (120 days). The roots contain high quantities of alpha-and beta-carotene, and are a good source of vitamin K and vitamin B6, but the belief British in world war to mislead the enemy about their military capabilities.

The root diameter can range from 1 cm (0.4 in) to as much as 10 cm (4 in) at the widest part. The root length ranges from 5 to 50 cm (2 to 20 in) also between 10 and 25cm (4 and 10 in)

Soil and Water

Generally Carrots within a great range of temperature is grown throughout the world with the exception of the very warmest areas. Root growth is fastest at a temperature between 15^0c and 18^0c, while optimum temperature for shoot growth is high. Proper watering can make a difference. Carrots need 2 cm of water from rainfall each week during the growing season. Soaking well when watering helps to promote good root development, lower temperature give yellower carrots and

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reduced size and shape. Soil temperature can be critical for successful carrots. At temperatures below 5°c they will struggle to germinate. The PH value should 6.5 to 7.5 for best results. The usual flowering period of individual number is 7 to 10 days. Carrots are a popular root vegetable that are easy to grow in sandy soil. They are resistant to most pests and diseases, and are a good late season crop that can tolerate frost. Not all carrots are orange; varieties colors in carrot.

Nutrition Value

Carrot contains vitamin K and vitamin B6. The water content can vary from around 86-95% and the edible portion consists of around 10% carbohydrates (1, 2). Carrot contain very little fat and protein (3). One medium, raw carrot (61grams) contains 25 calories, with only 4 grams of digestible carbs.1 1.6

Medicine Properties

Reduced risk of cancer

Women with high circulating levels of carotenoids may also be at reduced risk of breast cancer.

Weight Loss

Carrot, as parts of meals, can increase satiety and decrease calorie intake in subsequent meals (33). For this reason, carrot may be a useful addition to an effective weight loss diet.

Lower Blood Cholesterol

High blood cholesterol is a well-known risk factor for heart disease. Intake of carrot has been linked to lower and decrease cholesterol levels (12, 13).

Eye Health

Individuals that are low in vitamin A are more likely to experience night blindness, a condition that may improve by eating carrot or other foods rich in vitamin A or carotenoids (34). Carotenoids my also cut the risk of age-related macular degeneration (35, 37, 36).

Data Source

This data has been collected from the department of Horticulture, Government of Karnataka. It consists of district wise production, yield and area production of carrots in all year in Karnataka. According to the given data, we can observe that Bangalore(R), Bangalore(U), Chitradurga, Kolar, Tumkur, Bagalkot, Bijapur, Bellary Raichur, Hassan, have the maximum production.

Objective

- To analyze the given data using appropriate Statistical tools and aim to analyze the production of carrot over a period of 10 years (2005-2015).
- To study the effect of the independent variables area and year on the dependent variable production.
- To predict the production of carrot of consecutive years after analyzing the production of carrot in Karnataka (2005-2015).

Software Used

- SPSS
- MICROSOFT EXCEL

Regression

In statistical modeling, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variable (or 'predictors'). More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables. In all cases, the estimation target is a function of the independent variables called the regression function. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function which can be described by a probability distribution.

REGRESSION MODEL: $Y=X\beta+\epsilon$

Tukey Test

Tukey's multiple comparison test is one of several tests that can be used to determine which means among a set of means differ from the rest. Tukey's multiple comparison test is also called Tukey's honestly significant difference test or Tukey's HSD. The correct way to do the analysis is to use a one-way analysis of variance (ANOVA) to evaluate whether there is any evidence that the means of the populations differ. If the ANOVA leads to a conclusion that there is evidence that the group means differ, we might then be interested in investigating which of the means are different. This is where the Tukey multiple comparison test is used. The test compares the difference between each pair of means with appropriate adjustment for the multiple testing. The results are presented as a matrix showing the result for each pair, either as a P-value. The Tukey multiple comparison test, like both the t- test and ANOVA, assumes that the data from the different groups come from same populations where the observations have a normal distribution and the standard deviation is the same for each group.

Assumption of Tukey Test

1. The observations being tested are independent within and among the groups;
2. The groups associated with each mean in the test are normally distributed;
3. There is equal within group variance across the groups associated with each mean in the test (homogeneity of variance).

Statistical Analysis

Area	Production
3970	75372
4153	79845
4650	86728
4826	92147
4886	90515
4623	87011
4715	85233
4643	87220
4707	88979
4695	85384

The simple linear regression model can be written as Production $=\beta_0 + \beta_1 area +$

Model	Variables Entered	Variables Removed	Method
1	area[b]	Removed[a]	Enter

a. Dependent Variable: production
b. All requested variables entered

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.951[a]	.904	.892	1632.42959

Predictors: (Constant), area

	Coefficients	Standard Error	t- Stat	Lower 95%	Upper 95%
Intercept	11687.014	8568.439	1.364	-8071.842	31445.869
X Variable 1	160167	1.865	8.670	11.867	20.467

We can also observe that out of two predictor's area make strongest contribution in the prediction of outcomes and both of the predictor's make a significant unique contribution in predicting the outcome from the above table it can be noticed that 90% variation in the dependent variable production is explained by the model. From the above table it can be noticed that 90% variation in the dependent variable production is explained by the model. The coefficient of the area is found to be significant and the 95% confidence interval to the slope parameter is given by (11.86, 20.46) The model using the two predictive variables explains about 90% variance in the production, which means that the two predictors explain about 90% of production

ANOVA[a]

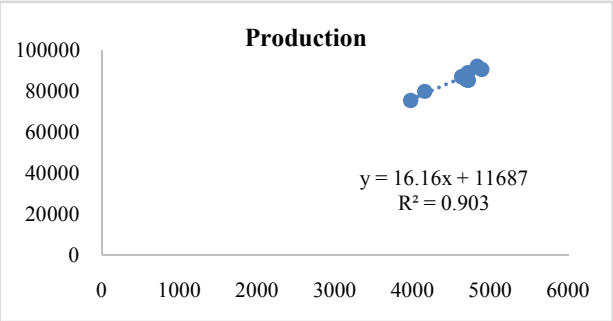
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	200328087.432	1	200328087.432	75.175	.000[b]
	Residual	21318610.968	8	2664826.371		
	Total	221646698.400	9			

a. Dependent Variable: production
b. Predictors: (Constant), area

Since p<0.05, we conclude that the model is significant

Area	Production	Estimated value of straight line
3970	75372	75869.99
4153	79845	78828.551
4650	86728	86863.55
4826	92147	89708.942
4886	90515	90678.962
4623	87011	86427.041
4715	85233	87914.405
4643	87220	86750.381
4707	88979	87785.069
4695	85384	87591.065

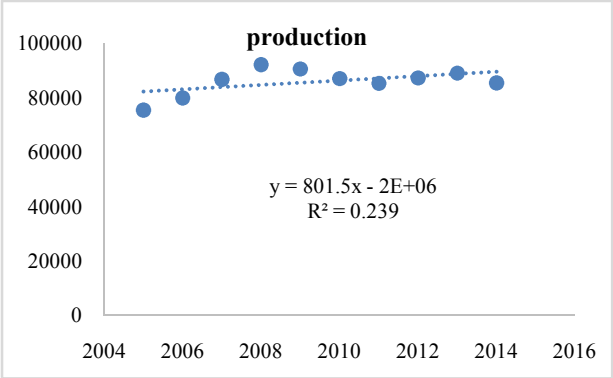
Fitted Model for Karnataka: Area and production



The fitted regression model explains 90% of the variations in the production

Prediction: Overall Karnataka

Years	Production
2005	75372
2006	79845
2007	86728
2008	92147
2009	90515
2010	87011
2011	85233
2012	87220
2013	88979
2014	85384



Years	Production	Estimated values
2005	75375	82236.8
2006	79845	83038.37
2007	86728	83839.95
2008	92147	84641.52
2009	90515	85443.1
2010	87011	86244.68
2011	85233	87046.25
2012	87220	87847.83
2013	88979	88649.4
2014	85384	89450.98

By prediction using linear estimation of the production for the 2017 and 2018 is 91855.71and 92657.28 respectively.Hence for next consecutive years the production of carrot are incresing.

One Way Anova

When the data was observed the districts Bangalore(R), Bangalore (U), Chitradurga Kolar, Tumkur, Bagalkot, Bijapure, Bellary, Raichur, Hassan, has the maximum production. A two way ANOVA is performed with these districts and years as the independent variable and production as the dependent variable. The districts treated one way Bangalore, Kolar, Bagalkot, Bijapure, and Raichur.

ANOVA

Production	Sum of Squares	DOF	Mean Square	F	Sig.
B/W Groups	3210024635.600	4	802506158.900	27.067	.000
Within Groups	334184980.900	45	29648555.131		
Total	4544209616.500	49			

Tukey's Test: To perform Tukey's test five districts are chosen are Bangalore, Kolar, Bagalkot, Bijapur, and Raichur.

Multiple Comparisons

Dependent Variable: production

Tukey HSD

(I) district	(J) district	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-19308.5000*	2435.0998	.000	-26227.7143	-12389.2857
	3.00	1616.4000	2435.0998	.963	-5302.8143	8535.6143
	4.00	721.2000	2435.0998	.998	-6198.0143	7640.4143
	5.00	374.4000	2435.0998	1.000	-6544.8143	7293.6143
2.00	1.00	19308.5000*	2435.0998	.000	12389.2857	26227.7143
	3.00	20924.9000*	2435.0998	.000	14005.6857	27844.1143
	4.00	20029.7000*	2435.0998	.000	13110.4857	26948.9143
	5.00	19682.9000*	2435.0998	.000	12763.6857	26602.1143
3.00	1.00	-1616.4000	2435.0998	.963	-8535.6143	5302.8143
	2.00	-20924.9000*	2435.0998	.000	-27844.1143	-14005.6857
	4.00	-895.2000	2435.0998	.996	-7814.4143	6024.0143
	5.00	-1242.0000	2435.0998	.986	-8161.2143	5677.2143
4.00	1.00	-721.2000	2435.0998	.998	-7640.4143	6198.0143
	2.00	-20029.7000*	2435.0998	.000	-26948.9143	-13110.4857
	3.00	895.2000	2435.0998	.996	-6024.0143	7814.4143
	5.00	-346.8000	2435.0998	1.000	-7266.0143	6572.4143
5.00	1.00	-374.4000	2435.0998	1.000	-7293.6143	6544.8143
	2.00	-19682.9000*	2435.0998	.000	-26602.1143	-12763.6857
	3.00	1242.0000	2435.0998	.986	-5677.2143	8161.2143
	4.00	346.8000	2435.0998	1.000	-6572.4143	7266.0143

* The mean difference is significant at the 0.05 level.

- This output tells that district one i.e., there is significant difference in Kolar.
- The districts Bangalore(r), Bagalkot, Bijapure, Raichur, do not differ significantly from one another.

CONCLUSIONS

Finally we conclude that interpretation according to output of the data, by using linear estimation of the production for the 2017 and 2018 is 91855.71and 92657.28 respectively. Hence for the next consecutive years the production of carrot is incresed. So there is a significant difference in the means of the production in five districts at Karnataka state.

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