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An Approach to Implement Vedic Mathematics to Agricultural System: A Review

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ABSTRACT

In this paper, we show the importance of Vedic mathematics to derive the optimal solution in agriculture *e.g.* for soil management and crop production, sowing of seeds *etc.* Since the primary requirement of any being is food *i.e.* anna, a man started to think about its production, because without production-consumption is impossible. Agriculture is the base of Indian agronomy or rural economy and the proper management of land is most essential for the same. We also study a systematic investigation on the Vedic agricultural system to prove is as the base of modern agronomy. Vedic Mathematics is an ancient system of calculation which was discovered from the Vedas between 1911 and 1918 by Sri Bharati Krishna Tirthaji Maharaj (1884-1960). Vedic Mathematics is a collection of techniques and formulas to solve mathematical arithmetic in easy and faster way; it offers a new and entirely different approach to the study of Vedic Mathematics based on pattern recognition. Mathematics is practical science as it helps us with the daily life. Arithmetic computations cannot be obtained faster by any other known method rather than Vedic mathematics, so this is the best way of understanding mathematics to agriculture students.

Key words: Agriculture, Crop production, Mathematics, Sutra, Vedas.

Mathematics is practical science as it helps us with the daily life. It also helps us to understand the mysteries of universe. The study of mathematics has two phases one outer another as inner. The outer direction moves us to applying number, order and mathematical relationships in world around us. It can be used practically and it is useful and beneficial.

Inner phase takes us back to the very foundation blocks upon which the subject stands and it reminds us of our origin, the unity, supreme self, which is the basis of entire creation.

Agriculture spans a wide area and a diverse range of practices and principles. It is a unique mixture of sciences having Mathematics as main component. A number of concepts and principles in Mathematics find explicit application and expression in various fields of agriculture such as animal and crop production, soil science, agricultural engineering and agricultural economics.

Farmers use mathematics as a system of organization and effectively utilize their time and manage their money. Farmers use numbers everyday for a variety of tasks, from measuring and weighing, to land marking. I also intend to explore some of the ways that mathematics is used in farming. In the Vedic system difficult problems or large sums can often be solved immediately by the Vedic method, France Thornley (1984), Muhrman (2015). These striking and beautiful methods are just a part of a complete system of mathematics which is far more systematic than the modern system. Some important contribution of Vedic mathematics can also be seen in Gupta (2015), Nicholas *et al.* (1982), Tirthaji (1965) and William (2005).

Agriculture in Vedic period

In the Vedic period, mathematical activities are mostly to be found in Vedic texts associated with ritual activities. However, as in many other early agricultural civilizations, the study of arithmetic and geometry was also impelled by secular considerations. The system of land grants and agricultural tax assessments required accurate measurement of cultivated areas. As land was redistributed or consolidated, problems of periodic distribution came up that required solutions. In order to ensure that all cultivators had equivalent amounts of irrigated and non-irrigated lands and tracts of equivalent fertility- individual farmers in a village often had their holdings broken up in several parcels to ensure fairness. Since field could not all be of the same shape, so local administrators were required to convert rectangular plots or triangular plots to squares of equivalent sizes and so on. Tax assessments were based on fixed proportions of annual or seasonal crop incomes, but could be adjusted upwards or downwards based on a variety of factors. This meant that an understanding of Mathematics especially geometry and arithmetic was essential for revenue administrators. Mathematics was thus brought into the service of both the secular and the ritual domains.

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Mathematics in agriculture

Mathematics plays a very important role in agriculture and is fruitful to all farmers. Some examples of the applications of mathematics in agriculture are as follows.

Measuring the fertility of soil

Knowledge of mathematics is very necessary and important for the analysis of soil, it can be used in measuring the moisture and acidity of soil. After these measurements, only farmer can decide that what kind of crops can be grown in the field and what kind of fertilizers he should use. Mathematics is applied when chemicals and fertilizers are provided to the soil. They need to measure how fertile the soil is and how much fertilizers with cost are required.

Estimating of crop yield

Any types of disease control in crops involve costs and decision making. Mathematical modeling is the way which can help to use resources in the most effective ways.

Calculating costs and profits

Evaluation of investments in loading trucks, storage tanks and manufacturing factors. Tax depreciation or investment, future value of money is all depend on mathematics.

Conversion of units and measurement of area

Area of field/plot is a very important aspect to consider in approximation of crop yield. Due to some uncertainties such as weather reliance and grain markets *etc*., much of farming is unpredictable. Farmers try to estimate the yield of certain field/plot of grain. For that, they pick a plant and count how many seeds are on the head, then by looking square footage of the field and estimating the numbers of heads, farmers can find an approximate amount of their yield.

Various authors have shown contribution of mathematics in agriculture in their research work *e.g*. Archana and Geeta Lekshmi (2020), Kumar and Kumar (2021), Rashmi *et al*., (2014) and Sugnathi *et al.* (2019) *etc.*

Useful calculations

In this section we learn how the easy calculations useful in agriculture can be done using Vedic Mathematics.

Converting Kilos to pounds

Let us start converting kilos to pounds. 77 kilos into pounds: Multiply the kilos by two. Means just double the kilos. $77 \times 2 = 154$.

Divide the answer by ten. It means just put a decimal point one place in from the right. 154/10 = 15.4. Add above two answers *i.e*. 154 + 15.4 = 169.4 77 Kilos = 169.4 pounds.

Temperature conversions

Here we see how to convert Fahrenheit to Celsius and vice versa. Subtract 30 from the Fahrenheit and then divide the answer by two. This is the approximate answer in Celsius. For example convert 82 Fahrenheit into Celsius: 82 Fahrenheit - 30 = 52. Then divide by two *i.e*. 52/2=26 Celsius.

Distance conversions

This is a useful method for changing km into miles and vice versa. The formula to convert kilometers to miles is number of (kilometers / 8) $\times$ 5. Let we take 72 kilometers into miles 72/8 = 9 multiplied by 5 is 45 miles.

Area of circular field

Here we find the area of circular field using area of square. Consider a circle of radius 5 meter; now assume a square round the circle with its side equal to diameter of circle *i.e*. 10 meter. Now divide this square in 9 equal parts, now the area of circle will be 7/9 times the area of square. Hence area of circle will be 7/9 (10^2) = 78 (approx).

From calculation parts, the results indicate that mathematics is an essential professional skill for farmers because they use mathematics all the time. Farming profession is today very advanced and as a farmer you do not only have use of practical skills. In a survey the farmers gave examples of job tasks that require skills of mathematics. Many of the farmers also said they only want to hire someone who has sufficient skills of mathematics as miscalculations can mean costly mistakes. Farmers must also be very good at mental calculation, rough calculation and probable assessments.

Vedic mathematics is the name given to the ancient Indian system of mathematics that was rediscovered in early twentieth century. Vedic mathematics is mainly based on sixteen principles or word formulae which are termed as sutra. So for Vedic mathematics will be better for fast and easy calculation in agriculture.

One can learn Vedic Mathematics from an early age and basic knowledge of multiplication table helps to better grasp the subject. When you use Vedic Mathematics you use both your left and the right brain hemisphere. The left side of the brain is the seat of language and processes in a logical and sequential order. The right side is more visual and processes intuitively, holistically and randomly which boosts memory and concentration. Since you are doing calculations mentally without the use of pen or paper you are actually concentrating which develops the concentration abilities. Thus, Vedic Mathematics is nothing but few tricks that helps in solving mathematical calculations quite easily. More and more use of Vedic Math can without any doubts generate interest in a subject that is generally dreaded by children. Hence, we can say Vedic Mathematics is very useful in agriculture.

CONCLUSION

Mathematics is very important in agriculture, but most of the time we do not able to realize it. Hence by planning and calculating, farmer can predict about his crop, investment, income and many more with the elementary knowledge of mathematics.

There are so many units related to farming such as acres, hectares, miles, tones, liters *etc*. units and

measurements used in farming are fairly unfamiliar to other areas but practically they are based on mathematics.

Vedic mathematics helps mathematical calculation used in farming more quickly and quite easily. It is a unique technique of calculations that is based on simple principles and rules, applying which, any kind of mathematical problems can be solved orally.

Conflict of interest: None.

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