7. Astronomy - Prediction Of Monsoon Rains; Parashara, Varamihira, Panchanga in comparison to modern methods

Modern scientific knowledge of methods of weather forecasting have originated recently. But ancient indigenous knowledge is unique to our country. India had a glorious scientific and technological tradition in the past. A scientific study of meteorology was made by our ancient astronomers and astrologers. Even today, it is common that village astrologers (pandits)are right in surprisingly high percentage of their weather predications.

Meteorology is generally believed to be a new science. It may be new to the west, but not in india, where this science has existed since ancient times. A systematic study of this science was made by our ancient astronomers and astrologers. The rules are simple and costly apparatus are not required. Observations coupled with experience over centuries enhanced to develop meteorology.

The ancient/indigenous method of weather forecast may be broadly classified into two categories.

1. Observational method

- Atmospheric changes
- Bio-indicators
- Chemical changes
- Physical changes
- Cloud forms and other sky features

2. Theoretical methods (or) Astrological factors (or) planetary factors

- Computation of planetary positions and conjunctions of planets and stars
- Study of solar ingress and particular date of months

- ❖ Study of Nakshatra Chakras
- ❖ Study of Nadi Chakras
- ❖ Dashatapa Siddhanta

Alamanacs in Indian astronomy and astrology (Panchangs)

According to the Encyclopedia Britannica (1969), “An almanac is a book or table containing a calendar of the days, weeks and months of the year, a register of ecclesiastical festivals and saint’s day and a record of various astronomical phenomena, often with weather prognostications and seasonal suggestions for countrymen”.

In India, the classical Hindu almanac is known as “Panchang’. This book is published yearly, and is the basic book of the society giving calendrical information on daily basis and is extensively used by the people all over India. For astrologers, it is one of the basic book for making astrological calculators, casting horoscopes, and for making predictions. For farmers, it is an astrological guide to start any farming activity.

The word ‘Panchang’ has it’s roots in two Sanskrit words, viz., ‘panch’ and ‘ang’, which means ‘five’ and ‘body part/limb’ respectively. These parts are

1. Tithi (or) Lunarday - Total of thirty tithis in a lunar month, fifteen in each fortnight.
2. Vara of week day - seven varas, namely

    Ravivara (Sunday)

    Somavara (Monday)

    Mangalavara (Tuesday)

    Budhavara (Wednesday)

    Guruvara (Thursday)

    Shukravara (Friday) and

    Shanivara (Saturday)

3. Nakshatra (or) asterism (or) constellation - Total of twenty seven nakshtras named according to the yagataras (or) identifying stars of each of the twenty seven equal parts of the ecliptic (or) solar path.

4.Yoga (or) time during which the joint motion of the sun and the moon covers the space of the nakshatra (there are twenty seven yogas).

5. Karana (or) half of a lunar day (or) half-tithi.

The other items considered for astrological prediction are

1. Rashi (or) twelve equal parts of the Zodiac belt, hence twelve rashis
2. Planets
3. Solar months and solar year
4. Lunar months and lunar year
5. Era

Theoretical basis of weather forecasting in ancient literature and panchangs.

According to Varahamihira and other scholars, the formation of clouds (or) garbhadharana takes place 195 days before their birth (or) delivery (or) garbhaprasava. During this period clouds were grouped as Abartak (Avartak), Sambartak (Samvartak), Pushkara and Drona. If abartak is dominating one year, rain will be received in certain places in that year; if sambartak, rain will be received in all of the country;

If pushkara, the quantity of rain will be very less; and if drona, that year will receive abundant rain water.

It is also true that even today, the cloud classification indicates Circus, Cirrostratus, Cirro cumulus, Altostratus, Altocumulus, Stratocumulus, stratus, Nimbo Stratus, Cumulus and Cumulonimbus. Among this, Nimbostratus and Cumulonimbus gives rainfall to the earth.

According to the ruling planet of a year, overall rainfall of that particular year should be

anticipated as follows:

S.No.	Ruling Planet	Rainfall
1.	Sun	Moderate
2.	Moon	Very heavy
3.	Mars	Scanty
4.	Mercury	Good
5.	Jupiter	Very good
6.	Venus	Good
7.	Saturn	Very low (Stormy wind)

For predicting the monsoon and its subsequent effects on weather, all panchang makers consider three different Nadi Siddhantas (Capsular theories) commonly known as Nadi charkas. These are:

1. Dwinadi charka
2. Trinadi charka
3. Saptanadi charka

Arrangement of nakshatras in Saptanadis and its associated effect on weather

SEVEN NADIS	EFFECT ON WEATHER
Chanda	Bright sunshine, no rainfall
Vata	Sunshine and wind, normal rainfall
Vanhi	Strong hot wind (Westerlies)
Soumya	Normal rainfall
Meera	Very good rainfall
Jala	Abundant rainfall
Amrita	Heavy to very happy rainfall causing flood

Prediction analysis and discussion

The analysis indicates that rainfall predictions made in panchangas based on ancient astrological theories are, on an average, better and in some cases at par with the predictions made by Govt. meteorological department through modern techniques and procedures.

(E.g.) The yearly truly corrected predictions of rainfall made during 1946-1995 were 75, 78, 74 and 75% respectively for different panchangam. The seasonal prediction also indicated that it was 89% for summer, 55% for rainy, 90% for winter and 78% for overall.

Method of measurement of rainfall

The method of measurement of rainfall is described by Varahamihira. A circular vessel

with a diameter equal to one (human) arm or the distance measured by the width of 20 (human) fingers and with a depth equal to the distance measured by the width of eight fingers should be accepted for measurement of rainfall. When this vessel is completely filled with rainwater, the rainfall should be equal to 50 palas or one adhaka. This method has been explained by the Parashara.

A model for forcasting seasonal rainfall recorded in Brhat Samhita

Brhat Samhita reveals that even in the sixth century AD, Varahamihira, a resident of Malwa (present-day western Madhya Pradesh) faced the problem of uncertainty of monsoon rains. The date of onset of such rains could not be predicted and so the amount of rainfall during the season was also a gamble. As he was proficient in astrology, he tried to evovle or adapt a technique which was based on that science. This technique lays down that after the occurence of the full-moon day of the month of Jyestha (approximately coinciding with June of Gregorian calendar), the asterism or lunar mansion or nakshatra of the day on which the first rainfall of that year's rainy season is received should be noted. This asterism provided the basis for the forecast of seasonal rains (Table). While giving this forecast, it was also necessary to take into account the area over which the first rainfall of the season had occured. There are twenty-seven such asterisms or lunar mansions in Indian astrology, with each one falling under a particular zodiac sign.

Table : Varahamihira's technique for forecasting seasonal rains.

	Zodiac sign	**Predicted total seasonal rainfall**

	Sanskrit	**English**	**In ancient units2**	**In modern units**
Lunar mansion 1			**(dronas)**	**(cm)**
Hasta	Kanya	Virgo	16	102.4
Purvashadha	Dhanu	Sagittarius	16	102.4
Mrugshirsha	Vrushabha	Taurus	16	102.4
Chitra	Kanya	Virgo	16	102.4
Revati	Meena	Pisces	16	102.4
Dhanistha	Makara	Capricorn	16	102.4
Satabhisaj	Kumbha	Aquarius	4	25.6
Jyeshtha	Vrushchika	Scorpio	4	25.6
Swati	Tula	Libra	4	25.6
Krittika	Vrushabha	Taurus	10	64.0
Shravan	Makara	Capricorn	14	89.6
Magha	Simha	Leo	14	89.6
Anuradha	Vrushchika	Scorpio	14	89.6
Bharani	Mesha	Aries	14	89.6
Mula	Dhanu	Sagittarius	14	89.6
Purvaphalguni	Simha	Leo	25	160.0
Punarvasu	Mithun	Gemini	20	128.0

Vishakha	Vrushchika	Scorpio	20	128.0
Uttarashadha	Makara	Capricorn	20	128.0
Ashlesha	Karka	Cancer	13	83.2
Uttarbhadrapada	Meena	Pisces	25	160.0
Uttaraphalguni	Kanya	Virgo	25	160.0
Rohini	Vrushabha	Taurus	25	160.0
Purvabhadrapada	Kumbha	Aquarius	15	96.0
Pushya	Karka	Cancer	15	96.0
Ashvini	Mesha	Aries	12	76.8
Aardra	Mithun	Gemini	18	115.2

1 On the day of the first rainfall of the season

2. 1 drona = 6.4 cm

Monsoon forecast for Southern Tamil Nadu in India based on Saint Kaikkadar's predictions.

Year	**Name of the Tamil Year**	**Forecast of rainfall**	**Preferred rainfed crops**
2001/02	Vishu	Average	Millet, Pulses, Vegetables
2002/03	Chitrabanu	HIgh	Rice, groundnut
2003/04	Subanu	Below average	Small millet, pulses

2004/05	Tharana	Below average	Small millet, pulses
2005/06	Parthipa	Average	Cotton, rice, vegetables
2006/07	Via	High	Rice, cotton, sugarcane
2007/08	Sarvapithu	Very High	Rice, maize, sugarcane
2008/09	Sarvathari	High	Rice, Maize, sugarcane
2009/10	V irothi	Very high	Rice, maize
2010/11	Vihirthi	Very high	Rice, maize
2011/12	Kara	Very high	Rice, maize
2012/13	Nandana	Below average	Millet, oilseeds
2013/14	Visaya	High	Rice, cotton
2014/15	Seya	Average	Cotton, millet, vegetables
2015/16	Manmatha	Average	Cotton, millet, vegetables
2016/17	Thunmuki	Average but only in the later part of the year	Groundnut, cotton
2017/18	Avilambi	Below average	Millet
2018/19	Vilambi	Average	Cotton, millet
2019/20	Vikari	Very low	Millet
2020/21	Sarvari	Very low	Millet
2021/22	Pilawa	Below average	Millet
2022/23	Subakiruthu	Very low	Millet

2023/24	Sobakiruthu	Average	Millet
2024/25	Kurothi	Very low	Millet
2025/26	Visivavasu	High	Cotton, rice
2026/27	Prabava	Average but only in the later part of the year	Groundnut, cotton

2027/28	Pilavanga	Average	Cotton, millet, vegetables
2028/29	Kilaga	High	Cotton, rice, groundnut
2029/30	Sowmia	Average	Cotton, rice, groundnut
2030/31	Sathaarana	High	Cotton, rice, groundnut
2031/32	Virothikiruthu	High	Rice, groundnut, vegetables, Chickpea
2032/33	Parithabi	Below average	Millet, sorghum
2033/34	Pramadesa	Very high	Rice, maize, pulses
2034/35	Ananda	Very high	Rice, maize, pulses
2035/36	Raatsara	Below average	Small millet, pearl millet
2036/37	Nala	Very low	Rice, maize, cotton
2037/38	Pingala	Very low	Small millet, pearl millet

2038/39	Kalayuthi	Above average (Very high in northern Tamil Nadu)	Rice, maize, cotton
2039/40	Siddharthi	Below average	Millet, sorghum
2040/41	Rowthri	Below average (famine expected)	Millet, small millet
2041/42	Thunmathi	Low (famine expected)	Millet, minor millet
2042/43	Thunthubi	Average	Rice, cotton
2043/44	Ruthrothkari	Average in the later half of the year	Rice, groundnut
2044/45	Rathakshi	High	Rice, cotton, sugarcane
2045/46	Krothana	Above average	Rice, groundnut, cotton
2046/47	Atchaya	Average	Rice, groundnut, vegetables
2047/48	Prapava	Above average to heavy	Rice, vegetables, groundnut
2048/49	Vivaba	Above average to heavy	Rice, groundnut, vegetables
2049/50	Sukkila	Above average	Rice, vegetables, groundnut
2050/51	Premadootha	Below average	Millet, pulses
2051/52	Prasorpathi	Heavy	Rice, vegetables, groundnut

2052/53	Angirasa	Heavy	Rice, vegetables, groundnut. sugarcane
2053/54	Srimuga	Average in the later half of the year	Rice, groundnut
2054/55	Pava	Above average	Rice, groundnut
2055/56	Yuva	Above average	Rice, groundnut
2056/57	Thadhu	Average	Sorghum, groundnut, vegetables
2057/58	Eswara	Above average	Sorghum, groundnut, vegetables
2058/59	Veguthanya	Average in the later half of the year	Rice groundnut
2059/60	Pramathi	Below average	Millet, pulses
2060/61	Vikkirama	Below average	Millet, pulses

Comparison of actual rainfall (mm) received in Tamil Nadu, India with Saint Idaikkadar's forecast from 1950/51 to 2000/01.

Tamil year	**Gregorian Actual**	**Year Rainfall**
Vikruthi	1950/51	781A
Kara	1951/52	762A
Nandana	1952/53	686A

Vijaya	1953/54	1016A
Jaya	1954/55	969A
Manmatha	1955/56	824A
Thunmuki	1956/57	979A
Hevilambi	1957/58	909A
Vilambi	1958/59	747A
Vikari	1959/60	826A
Saarvari	1960/61	978A
Pilava	1961/62	867A
Subarkiruthu	1962/63	931A
Sobakiruthu	1963/64	907A
Kurothi	1964/65	859A
Visuvavasu	1965/66	870A
Prabhava	1966/67	1152A
Pilavanga	1967/68	958A
Keelaka	1968/69	682A
Sowmia	1969/70	1036A
Sathaarana	1970/71	918A
Virothikruthu	1971/72	968 A
Parithabi	1972/73	990A

Pramadesa	1973/74	839A
Ananda	1974/75	643A
Radshasa	1975/76	857A
Nala	1976/77	941A
Pingala	1977/78	1123A
Kalayukhi	1978/79	949A
Siddharthi	1979/80	1091A
Rowthri	1980/81	669A
Durmathi	1981/82	952A
Dundubi	1982/83	662A
Ruthrothkari	1983/84	1222[a]
Rathakshi	1984/85	791A
Krothana	1985/86	950[a]
Akshaya	1986/87	700A
Prabava	1987/88	982A
Viba	1988/89	708A
Sukkila	1989/90	916[a]
Premadootha	1990/91	714A
Prajorpathi	1991/92	898A
Ankirasa	1992/93	862A

Srimuga	1993/94	1171[a]
Pava	1994/95	933A
Yuva	1995/96	668DA
Thadhu 1	1996/97	1121 DA
Easwara	1997/98	1133A
Vekuthanya	1998/99	825A
Pramathi	1999/2000	904A
Vikrama	2000/01	705A

This above table clearly indicates that annual rainfall forecast for the tamil year was test verified. Out of fifty years forty eight years the forecast was in agreement (A) with prediction and only two years were in disagreement. (DA)

Krishi-Panchang

The researcher developed the Krishi panchang (or) Agroalmanac (or) Agropanchang. It may be defined as basic astro-agricultural guide book/calendar published annually, giving calendrical information on various aspects of agricultural and allied activities, basically suggesting region wise, seasonwise and cropwise. Crop strategy based on astro-meteorological prediction, giving auspicious time for undertaking various farm related operations, along with a list for performing religious rites, festivals, observing fasts and some non-astrological agricultural guidance, primarily useful for the farming communities and persons having interest in agricultural development.

The contents of the proposed Krishi-Panchang can broadly be categorized into two major

groups as follows:

1. Information which changes every year

- Annual date and Holiday calendar
- Month-wise daily guide for the whole year
- “Rashiphal”, i.e., month-wise forecasting of persons having different zodiac signs.
- Daily/monthly/annual weather forecasting for the particular year
- Crop prospects of that year based on planetary positions
- Season-wise crop strategy based on anticipated weather

2. Information which remains the same irrespective of any particular year

- Theories relating to agricultural and meteorological forecasting
- Auspicious moments for agricultural and allied activities
- Some general agricultural guidance.

Panchang-making

The content and coverage of the proposed Krishi-Panchang, indicate that only qualified astrologers cannot prepare the whole content on their own, rather an editorial board comprising of both qualified astrologers and crop specialists can do justice. While preparing the Panchang, the editorial board members should keep in mind the following important points :

- The **Krishi-Panchang** is largely meant for the local farming communities, having very low educational status. Hence, it must be in the local colloquial language to facilitate

reading and comprehension.

- Care should be taken to make the Krishi-Panchang easily understandable and clear in its meaning.
- It should be very comprehensive in its content and coverage with proven predictive information only.
- It should not contain any astrological details or complexities which would go beyond the understanding capability of our less educated farmers and agriculturists.
- It should be attractive in colour, and presentation of information should be systematic according to seasons (kharif, rabi, and summer) and crops.
- It must be low-priced/nominal-priced, within the affordable range of small and marginal farmers.
- More important is, it must be made available to the farmers and needy persons sufficiently in advance, i.e., at least1-2 months before the start of the agriculture year (july-june)