iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4762

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Scope of Cloud Seeding in India

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Abstract: ***As nowadays the amount of precipitation becomes less day by day due to climate changes, a new technique is used in many of the countries to increasing the rainy season and to prevent drought conditions. This technique term as 'cloud seeding' the cloud seeding also known as the artificial rain. The cloud seeding is combination of two words cloud indicate clouds in the sky and seeding means to provide the seeds or feed to the cloud in the form of water. Many developed countries use this technique to improve monsoon season and also to reduce the drought conditions in various parts of the nations. In India this technique not quite successful. So this article gives the future phenomenon of uses of cloud seeding process in India. Harmful effects may be come in future but this technique gives a innovative idea to nation.***
Keywords: El Nino, Silver Iodide, Dry Ice, Nimbus, Brownish, Explosive rockets.

I. INTRODUCTION

Cloud seeding is defined as an International treatment of clouds to enhance rainfall. When aerially sprayed with the help of aircraft's, certain chemicals such as sodium chloride and silver iodide (non toxic salt) can augment rainfall. Millions of tones of water in the form of vapour, droplets and ice particles constantly flow in atmosphere. Clouds are either make of tiny droplets or ice crystals but sometimes they are combination of both.

The droplets are extremely small in order to form a cloud, the droplets first form around microscopic particles or dust, smoke, salt crystals, soil and other materials that are present in the atmosphere in abundance. These particles there are known as cloud condensations nuclei. Among these particles there are few ice forming nuclei, on which water droplets condense due to their capacity to absorb water. The process of condensation takes place as the air temperature decreases. As a result the capacity or air to hold water vapour is decreased. If cooling continues, a point is reached where the amount of water that the air can hold reaches it maximum capacity.

This temperature is called dew point; at this point water vapour begins to condense into tinny droplets .The process of condensation may cause cold rain or warm rain. The cold rain happens in tropical regions and the process is so called because precipitation falls from clouds where the temperature is more than 0oc. Rain is formed in warm clouds when larger water drop lets collide with and absorb smaller ones. Substances capable of absorbing moisture from the atmosphere such as NaCl or Agl are used to induce warm rains. The cold rain process occurs when the temperature, in all or some parts of a cloud , is less than 0oc. These clouds are generally composed of both ice crystals as well as water droplets.

The droplets, until their weight causes them to fall. While falling, the crystals may melt and join with the small liquids water droplets. They may then into rain drops in a manner similar to the warm rain process. If the crystals do not melt, they may grow into large snowflakes by agglomeration and reaches the ground as snow. Silver iodide or dry ice (Solid co2) is used to supply naturally deficient clouds with the proper concentration of ice crystals to enhance rain fall through the cold rain process. The most important conditions for both the initiation of rainfall and determining its amount include.

A. The vertical and horizontal dimensions of the clouds.
B. The lifetime of the clouds.
C. The sizes and concentration of clouds droplets, and
D. Ice particles.

Under proper conditions seeding the cloud can even favourably modify one or more of these factors. It should, however be noted that seeding may lead to copious rainfall is unintended regions, leading to floods. Cloud seeding Technology is used for artificial Rain Aircraft is used for cloud seeding process. According to the weather data or statics clouding seeding is used.

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II. PROCESS OF CLOUD SEEDING

Aircraft, mini- blasting rockets (explosive rockets) ,Balloons may be used in cloud seeding ' Through the cloud seeding process with the help of Aircraft silver iodine (dry free) sprayed into the cloud. Silver iodine Attract the water drops which are already exists in the clouds. When they comes contest in the dry ice they convert into the drops. And these drops fall in the form of rain on the earth. Mean while this Process is not 100% succeed or complete successful. Commonly the range of or distance of clouds 1-2 km from the earth, this technique is implemented (these clouds one also called Nimbus cloud). The colour of clouds Brownish.

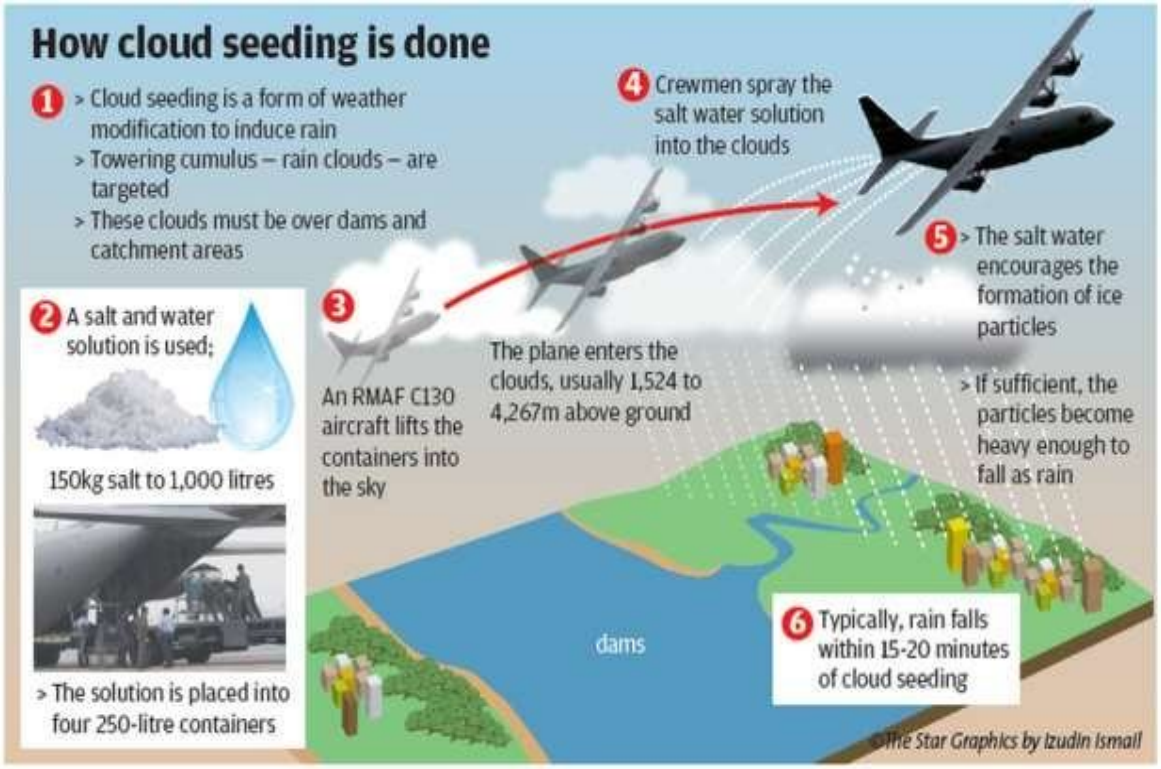

Fig.1. Process of cloud seeding.

As the figure show the complete process of cloud seeding. The clouds are targeted which only about to 1-2 km from earth surface. The colour of these clouds is brownish. These clouds are called Nimbus. The silver iodine or dry ice used as the form of feed sometimes a salt and water solution is also used. 150kg salt is require for 1000literes of water. The solution is placed into the 250 litres containers. So that transportation may be done so easily. After the plane enters into the clouds and the dry ice react with the clouds and completely follow the condensation process. The salt water encourages the formation of dry ice particles. The water drop convert into the heavily drop water and enough heavy to processing the precipitation or the rainfall. After that process the rain may falls after or within 15-20 minutes of the cloud seeding. This process may not 100% success but show the ideas for the futures droughts problem may be reduced. However this technique may also be used to control the heavy rainfall intensity. In this problem the the same procedure follow but aircraft is launch towards the direction of wind.

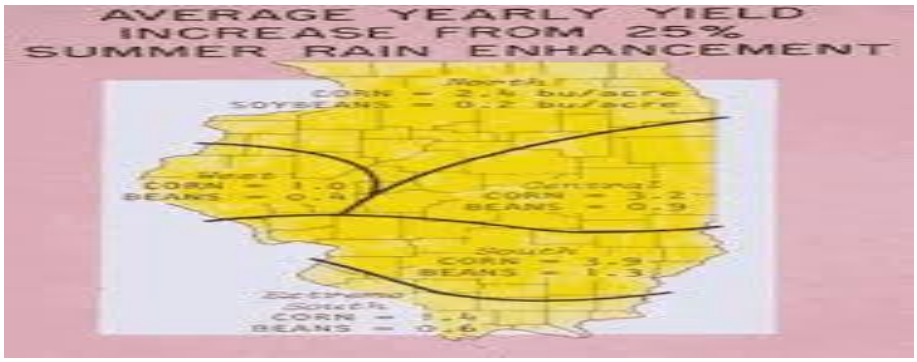

Fig.2. Shows the weak monsoon period is increased with cloud seeding process and it also affect the productivity of crops.

In Israel & china this Technology is used in very great level. In the rainy season when the rain is not proper with the help of this techniques , monsoon season may be increase up to 10% , In 2008 on the occasion of closing ceremony of Olympic china (Beijing) is used this technology where the very heavy rain forecasted . Israel ,china. South Africa ,Saudi Arab & USA etc. one the primary customer of this techniques . Since the 1946 this techniques was became highlighted.

Fig.3 shows the diffrence before seeding and after seeding

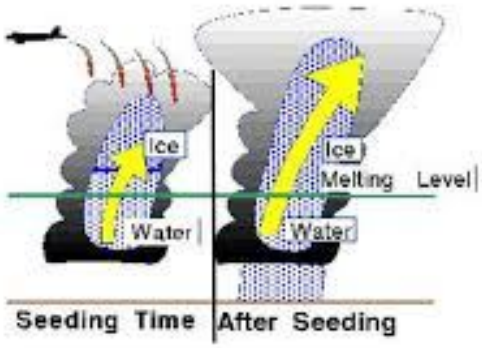

Diagram of the seeding of the upper part of a cloud by airplane, after which more rain is hoped to develop (graphic: NOAA Hurricane Research Division)

III. HISTORY OF CLOUD SEEDING

In 1946 American scientist Vincent Shafer invented the this technology through the deep freezer . 1990 America used these technology to increase the monsoon season Vincent Shafer have said that this technique is 100%. Successful sometimes its fails. Precipitation data from a number of cloud seeding projects have been examined in details proof of downwind effects. The first cloud seeding project in U.S southern part begun in the early of 1950. In 1973 the U.S government passed the legislature act of cloud seeding. This law provided for licensing cloud seeding operators and permitting cloud seeding projects by the U.S division of water resources. The China also used cloud seeding process for reduce the precipitation or increase in monsoon. China used this techniques sincec1991 but this technique came into the action during the closing ceremony of Olympics games in 2008. In developing countries like India this techniques is not used till now. One or two times in very critical situations scientist suggest this idea but all the attempt are fail. On the other hand Israel which is also a developing country where water resources are very less and precipitation in every monsoon season is very low also used this techniques from 1997 at very large scale to complete the their demand of supply of water. Israel making sponge cities from 2011 so that the water may used at the time of emergency or drought situation.

IV. CLOUD SEEDING IN INDIA

Cloud seeding techniques is very new in India. It is not anywhere used in the country. Many of the experiment related to this technique has been done but not success. Very heavy rain intensity destroyed the several parts of Maharashtra since 6-7 years. But from 2-3 years these area declared drought area by the go I on Monday 3 august 15 2014 in Nasik district. Artificial rain process started but this process fails. Total 5 rockets one launch out of two rocket hits the target but these one not enough for the satisfactory rain. This technique is firstly used in Maharashtra in India. In Aurangabad district. (Maharashtra) 4 king air B-200 plain are arranged to carrying the silver Iodine (dry fee) Doter radar are imported from the America for the purpose of cloud seeding technology should be completed with result oriented goals. But the result of this techniques in Maharashtra not Satisfactory. southern state became the most recent try with the cloud seeding to bring back rain. It is the third consecutive year that seasonal monsoons have failed. Drought hit Karnataka. Mass migrations and farmer suicides and the problematic agricultural scenario in the state. The GOI approved a budget of 9crore for attempt the cloud seeding. The name of project is ‘Project Varuna’. Bangalore based Hoyasala projects pvt. Ltd. Won the contract tender which completes the project with the help of US made aircraft. So the cloud seeding may be milestone in the history of India if this technique achieved 100% success.

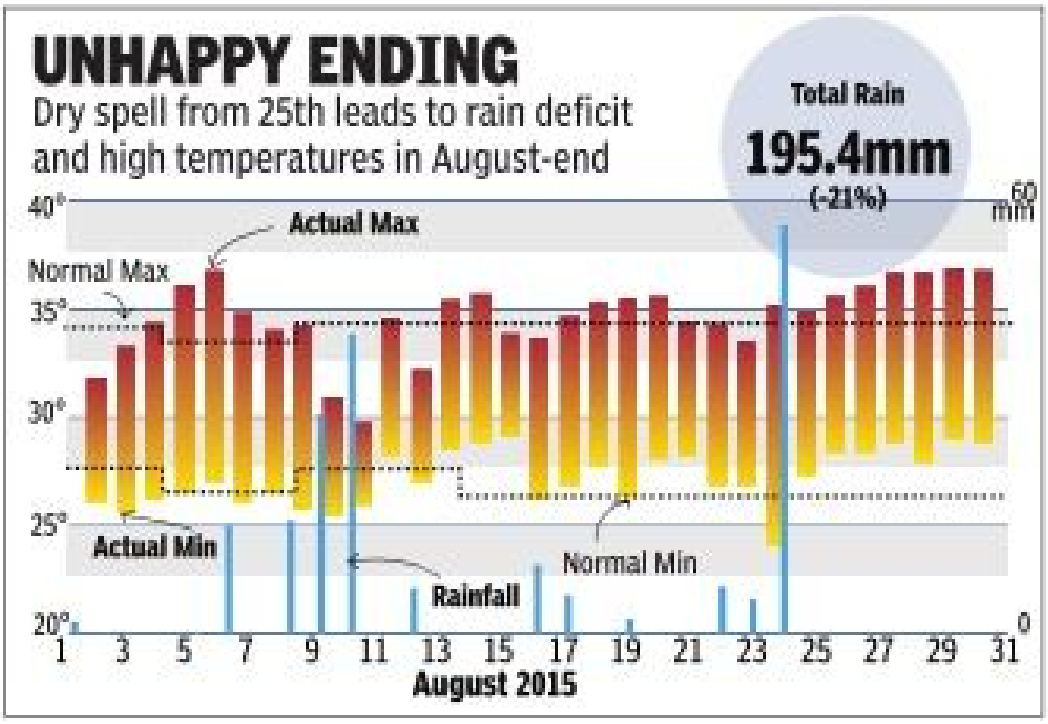

Fig.4. Shows the fall of rainfall in year by year decrease.

V. EFFECTS OF CLOUD SEEDING IN OUR NATURE

According to the expert "Tara Prabhakaran"(Director of G.B pant Himalayan institute) silver iodine is very toxic for our environment. It also a very expensive techniques – most of the countries would ignoring this technology. This technique disturbs the natural precipitation. So the uses of this technology should be at the critical situation.

VI. CONCLUSION

Cloud seeding is new technique it should be used in case of emergency otherwise this techniques may course the different environment unbalanced situation. Evidence approves that if the conditions are right cloud seeding does modify cloud development and silver iodide or ice crystal formation which could lead to an increase in rain or precipitation reaching the ground. One of the problems with proving that cloud seeding is effective is that it is hard to measure precipitation changes due only to seeding versus changes due to natural factors. In general cloud seeding experiments have shown that a 5 % to 20 %increase in precipitation can be expected from a well designed and properly conducted cloud seeding project.

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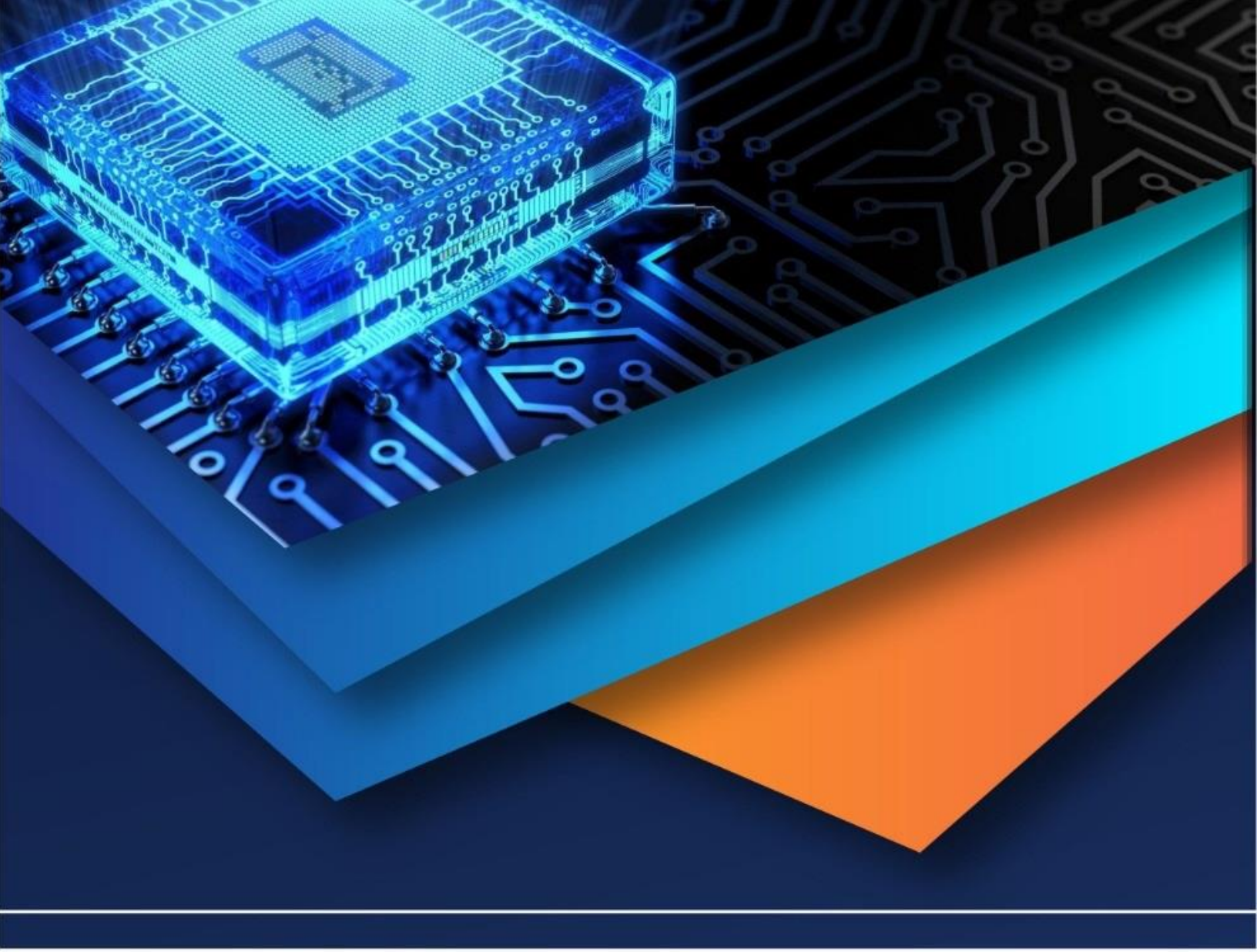

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